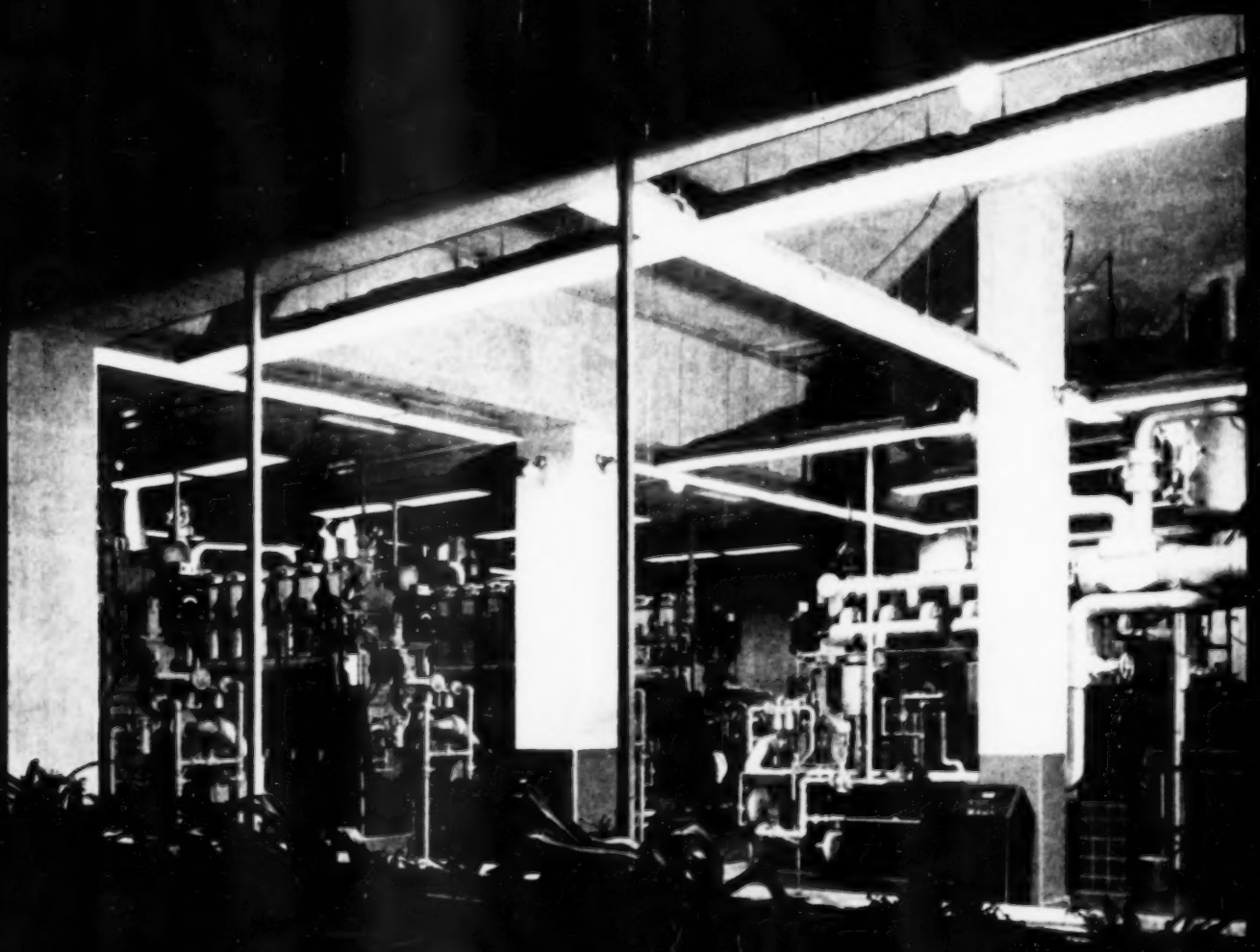
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



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MARCH, 1954

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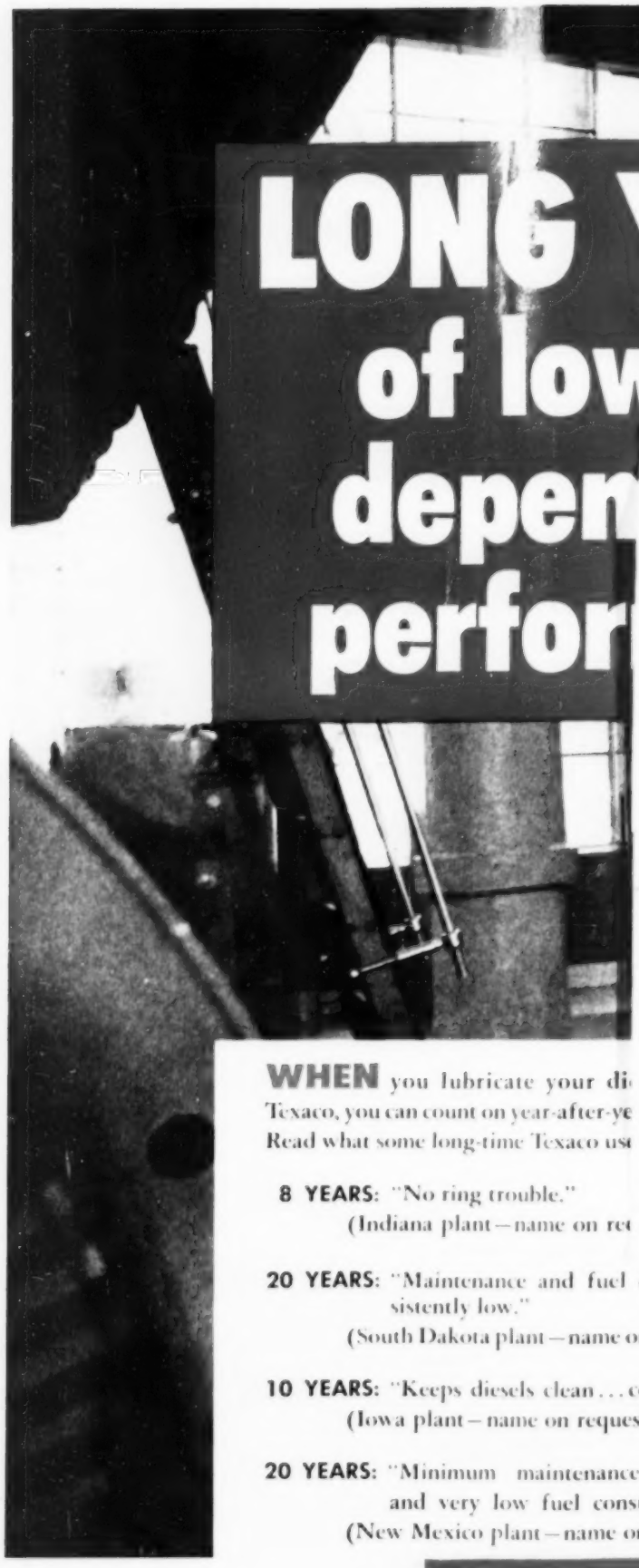

WA

PAG

WHEN you lubricate your di
Texaco, you can count on year-after-ye
Read what some long-time Texaco us

8 YEARS: "No ring trouble."
(Indiana plant—name on re

20 YEARS: "Maintenance and fuel costs consistently low."
(South Dakota plant—name on request)

10 YEARS: "Keeps diesels clean . . . costs low."
(Iowa plant—name on request)

20 YEARS: "Minimum maintenance expense and very low fuel consumption."
(New Mexico plant—name on request)

with the recommended method of the famous *Texaco Ursa Oil* series—a complete line of oils especially refined to make diesel, gas and dual-fuel engines give *more power* with *less fuel* over *longer periods* between overhauls.

A Texaco Lubrication Engineer will gladly give you full details. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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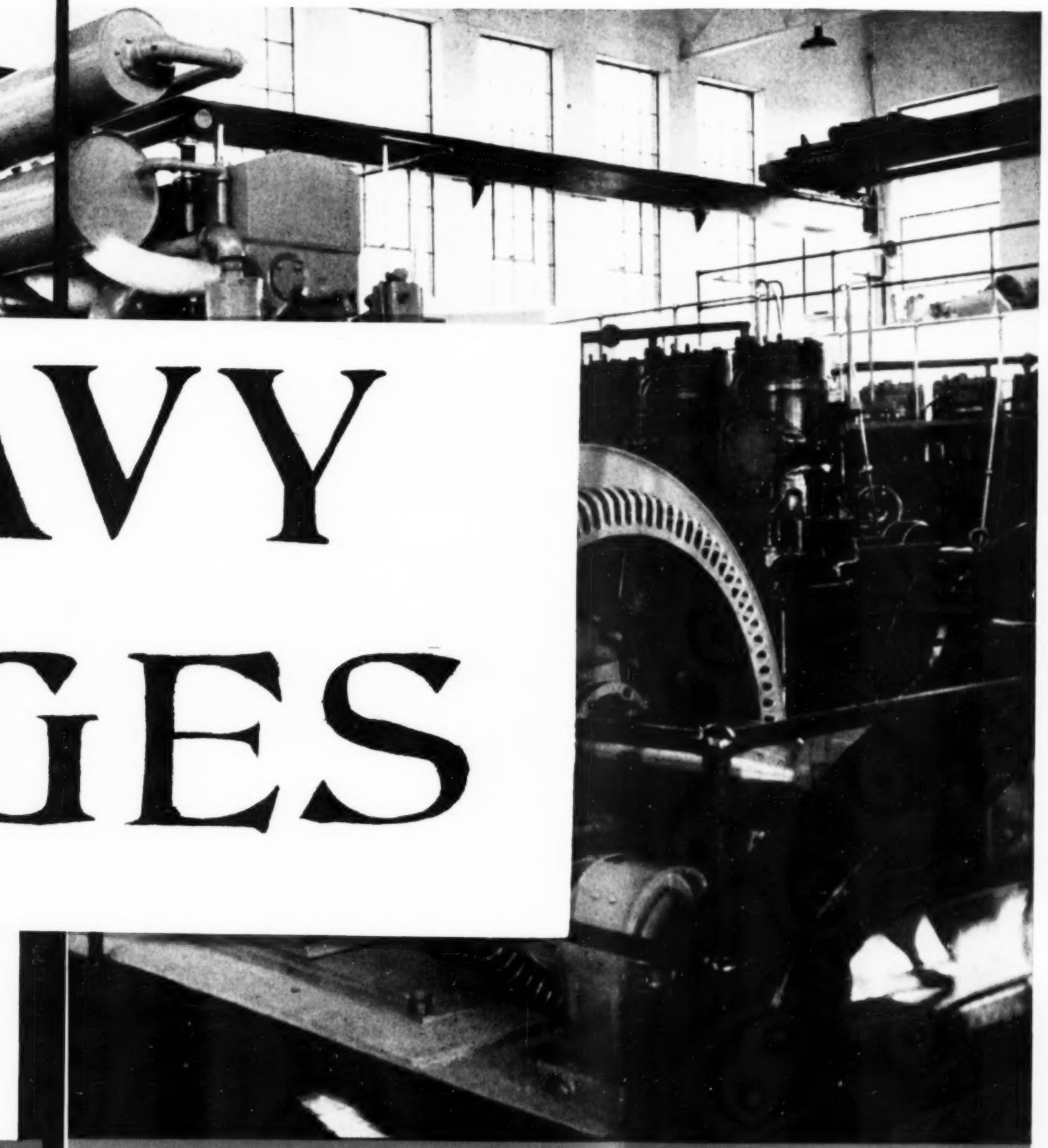
radio broadcasts
every Saturday afternoon.
See newspaper for
time and station.

TEXACO

TEXACO



AVY

GES

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

WHEN you lubricate your diesels with Texaco, you can count on year-after-year benefits. Read what some long-time Texaco users say—

8 YEARS: "No ring trouble."
(Indiana plant—name on request)

20 YEARS: "Maintenance and fuel costs consistently low."
(South Dakota plant—name on request)

10 YEARS: "Keeps diesels clean . . . costs low."
(Iowa plant—name on request)

20 YEARS: "Minimum maintenance expense and very low fuel consumption."
(New Mexico plant—name on request)

These examples are typical. They help explain why—

For over 20 years, more stationary diesel horsepower in the U. S. has been lubricated with Texaco than with any other brand.

To assure these benefits in your plant, lubricate with the recommended member of the famous *Texaco Ursa Oil* series—a complete line of oils especially refined to make diesel, gas and dual-fuel engines give *more power* with *less fuel* over *longer periods* between overhauls.

A Texaco Lubrication Engineer will gladly give you full details. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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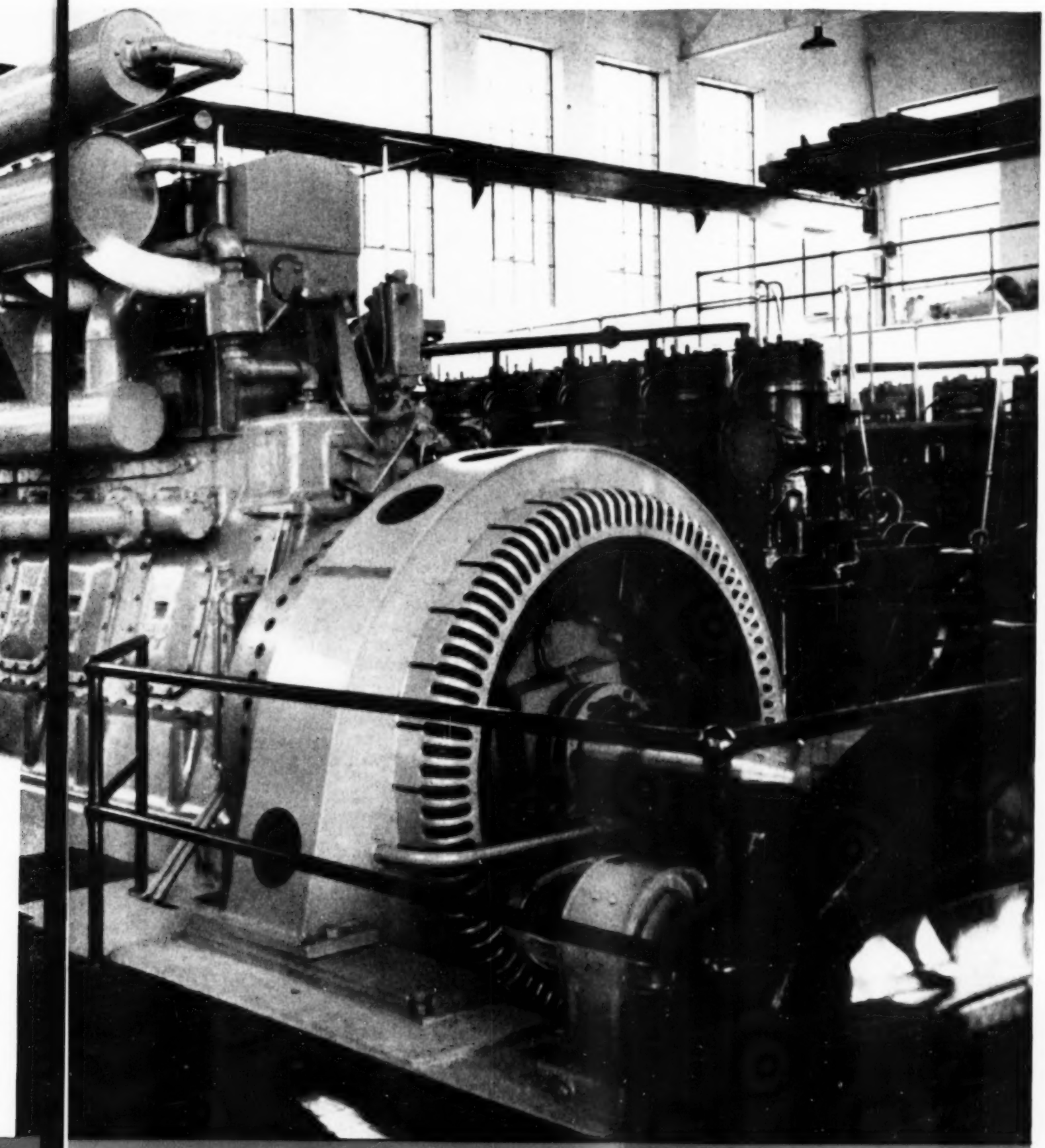

URSA OILS

FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES

DIESEL and GAS ENGINE PROGRESS

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FRONT COVER ILLUSTRATION

View through the window of the San Diego Sewage Treatment Plant showing the Enterprise engines. There are six Model GSG6 spark-ignition engines in operation here. Four of them drive sludge pumps and the other two drive blowers.

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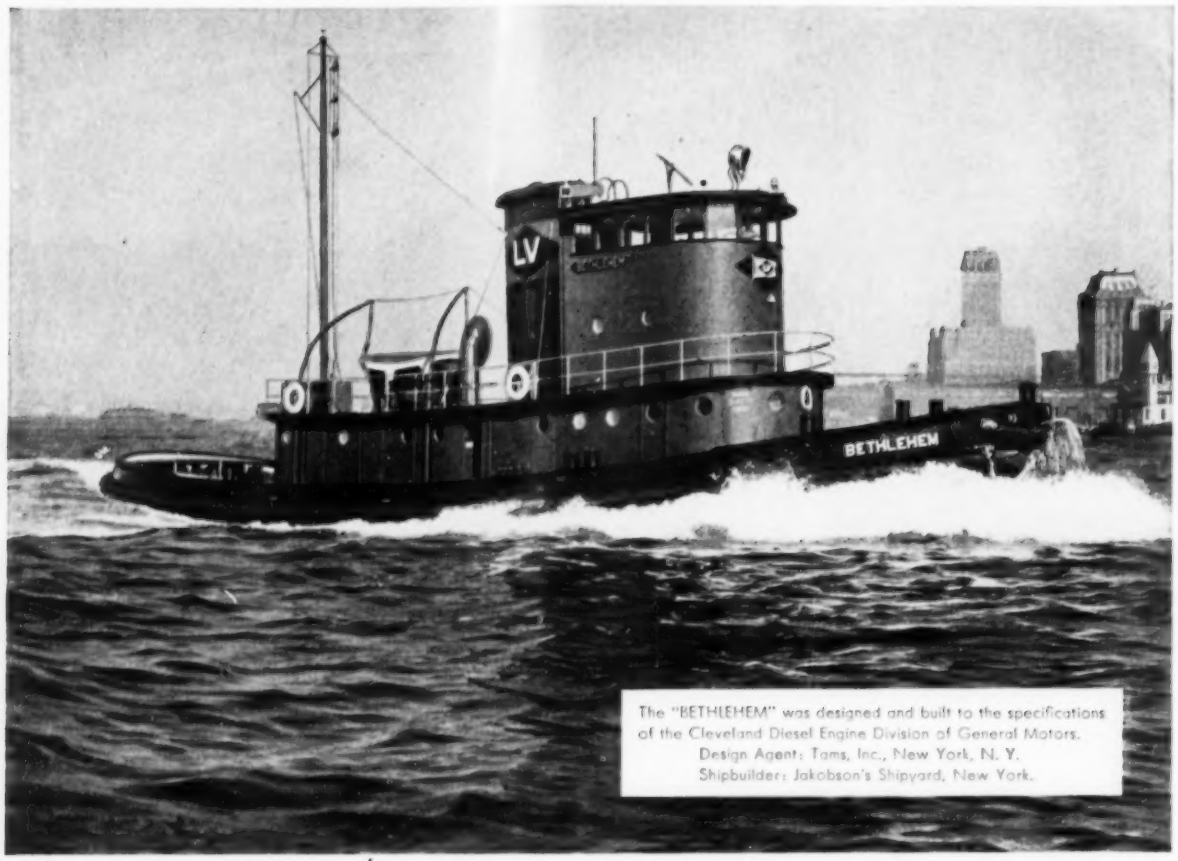

The "BETHLEHEM" was designed and built to the specifications of the Cleveland Diesel Engine Division of General Motors.
Design Agent: Tams, Inc., New York, N. Y.
Shipbuilder: Jakobson's Shipyard, New York.

Now it's 6 for Lehigh

The "BETHLEHEM" is the sixth Diesel-Electric powered tug to be placed in service since 1949 by the Lehigh Valley Railroad. The dependable and efficient service given by her sister tugs — "WILKES-BARRE," "HAZLETON," "CORNELL," "LEHIGH" and "CAPMOORE" — is why General Motors Diesel-Electric Drive is the first choice of the railroads today.

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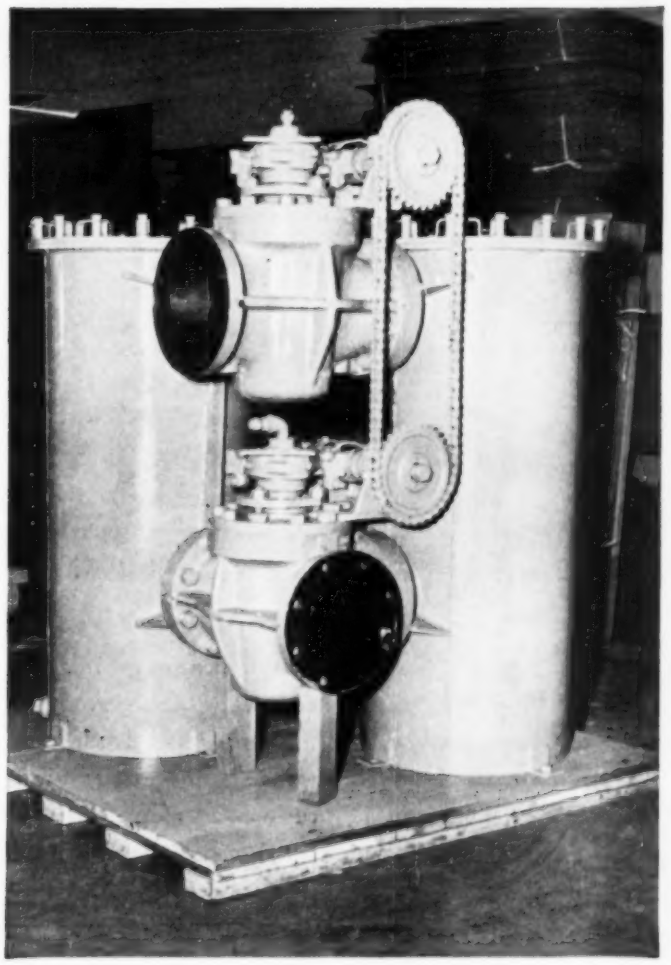
NEW! AIR-MAZE DUPLEX LUBE OIL FILTERS FOR LARGE MARINE AND STATIONARY DIESELS!



THIS new Air-Maze lube oil filter for *large* marine and stationary diesels stops damaging particles as small as .0032", handles 360 gpm. at normal lube pressures up to 100 psi. It readily met the exacting requirements of a large insurance company.

The new duplex filter stays on the job even if one of the filters has to be serviced. Here's how: two individual filters are connected by a chain linkage so that when one valve is closed, the other one is automatically opened. Since both filters can't be shut off at the same time, there's no danger of close tolerance parts burning out due to lack of lubrication.

This model filters at high flows by using multiple cartridge assemblies, providing an exceptionally large filtering area. Drain plugs near the bottom of the filter shell easily drain off sludge contaminate.

With a background of twenty-nine years experience and thousands of applications, Air-Maze, the filter engineers, have met practically every diesel filtration and silencing need. Air-Maze serves the industry with a complete line of intake silencers, oil-bath filters, lube oil strainers, fuel filters and other products. For help with your filter problems, contact your nearby Air-Maze representative or write The Air-Maze Corporation, Cleveland 28, Ohio.

The biggest names in diesels are protected by Air-Maze filters

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The Filter Engineers

LIQUID FILTERS
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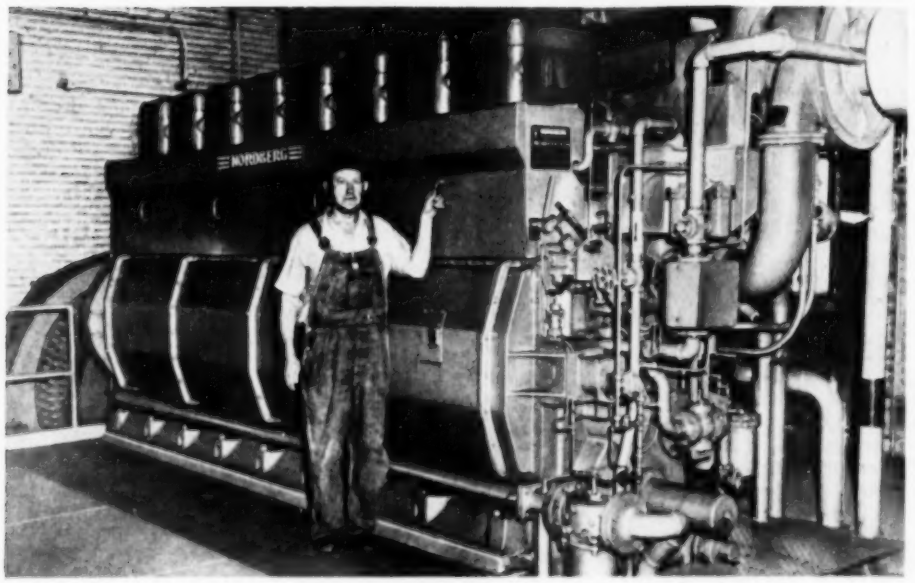
GREASE FILTERS

This engine maintains a lubricating oil economy of approximately 18,000 H. P. hrs. per gallon



Here's operating efficiency as it has been proved at the Municipal Power Plant, Lindsay, Oklahoma.

A lot of the lubricating oil economy can be credited to the piston rings installed in this Nordberg Duafuel engine. They are Koppers American Hammered Piston Rings. (Porous Chrome*, Tapered O. D., and Grooved Oil Cutter Rings.)

Many manufacturers of diesel and pumping machinery insist on Koppers Rings for their equipment because they know that Koppers Rings make for satisfactory performance.

Test after test also prove that, when Koppers Rings are used for replacements, operating efficiency, and economy are markedly increased . . . often doubled. And Koppers Rings last so much longer that labor costs and costly down-time for repairs are greatly reduced.

So, to save on lubricating oil, to cut down costs, to help save on fuel, remember Koppers. Next time you have an overhaul, think of Koppers first. We are always ready to consult with you on your specific piston ring problems. And for the latest information on Koppers Rings, mail the coupon below.

Koppers Porous Chrome* Rings. Porous chrome surface holds and distributes oil during break-in. Seats quickly. Chrome prevents grit from embedding in ring surface. Prevents cylinder wall scratching. Reduces wear 50%. Lasts 4 times longer than other rings.

Koppers Oil Cutter Rings maintain high unit pressure on the oil film. Seats rapidly. Slots in back of ring permit oil collected in channel on down stroke to flow into interior of piston. Proved efficient in thousands of installations. Extremely popular in vertical compressors and internal combustion engines.

*Van der Horst Process

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New diesels get same "lube diet" that kept old units healthy...

For many years, the Las Animas Municipal Power and Light Company kept its original diesel equipment operating at remarkably low cost. Using Standard diesel oils, down time and maintenance were negligible in spite of greatly increased loads that forced the units far beyond their rated capacities.

In 1951, when two new 1750 hp. Nordbergs were installed in the Las Animas, Colorado, power plant, it was natural for plant officials to select STANDARD HD Diesel Oil on the basis of this outstanding past performance.

Used exclusively in the new units, STANDARD HD has set a new high for healthy performance. In over two years of continuous hard service, STANDARD HD has supplied clean, protective lubrication. After 6000 hours of operation wear was so slight that it could not be measured; engines are kept clean constantly in all working parts.

● Diesel plant operators throughout the Midwest have discovered they can count on low cost diesel operation when they use STANDARD HD Oil. STANDARD HD provides an economical solution for costly maintenance problems—ring sticking and breaking, carbon deposits, cylinder wear—because STANDARD HD Oil lubricates, cleans *and* protects.

A Standard Oil lubrication specialist stationed near your plant throughout the Midwest can help you secure successful results in the operation and maintenance of your diesels. For his services, call your local Standard Oil Company office. Or write: Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

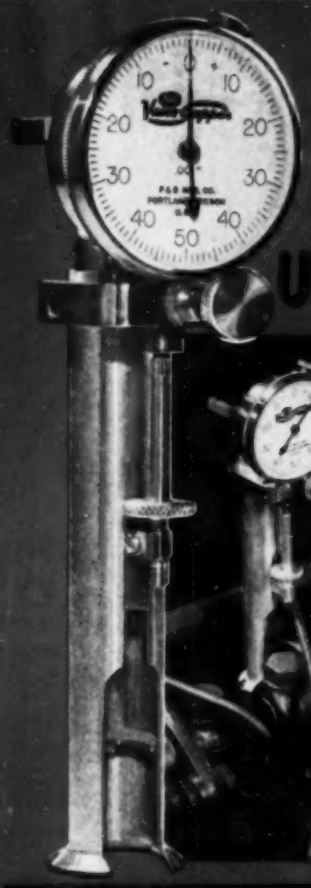
STANDARD OIL COMPANY
(Indiana)

STANDARD

STANDARD HD
TRADE MARK
OIL

Ralph Barbee, plant superintendent of the Las Animas Municipal Power and Light Company, checks the operating log with E. C. Jeffries, Standard Oil lubrication specialist.

Stop Feeling Your Way!



Use the New P&G Valve-Gapper

to ▶ SET VALVE GAPS
▶ TIME FUEL INJECTORS
▶ BALANCE FUEL RACKS

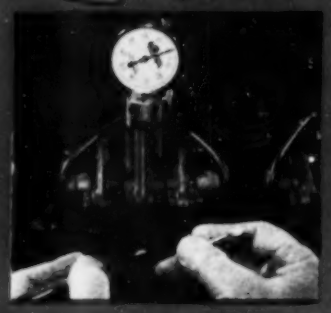
with Micrometer Accuracy

on GM DIESEL ENGINES

The Valve-Gapper is a precision instrument, utilizing an entirely new principle to adjust valve clearance, time fuel injectors and balance fuel injector racks. This new principle incorporates a dial indicator which registers the smallest variation in settings, eliminating the inaccuracies inherent in individual "feel".

The model 201 enables GM Diesel engine owners or operators, as well as mechanics to make these adjustments easily, quickly and with *micrometer accuracy.*

There is no departure from GM's recommended procedure—only the method of indication differs.



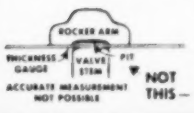
Both Hands Are FREE to Make Adjustments While Dial Indicator Registers Exact Setting

Above: Adjust Valve Gap Accurately—Valve-Gapper measures travel of rocker arm prior to contact with valve stem—both hands free to use tools.

Left: Time Fuel Injectors *Visually*—Dial indicator in fixing attachment measures exact height of injector follower guide above injector body.

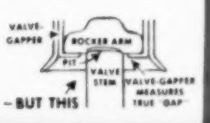
Left: Balance Fuel Injector Racks Quickly with Micrometer Accuracy—With the Valve-Gapper positioned between the control tube lever and cylinder head rib, the dial indicator registers the smallest variation in settings as other racks are matched to No. 1.

P&G VALVE-GAPPER 100% Accurate Even When Rocker Arms Are Worn or Pitted



NOT THIS—

The dial indicator registers *exactly* the entire travel of the rocker arm prior to contact with the valve stem, but a feeler gauge blocks-off the pit, making accurate measurement impossible.



—BUT THIS

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Models for Overhead Valve Gas Engines, Too!

Left: The model 101, engineered for Chevrolets, Oldsmobiles, Buicks, GMC, others, makes it possible for mechanics to set valve clearance quickly and easily with *micrometer accuracy.* The 101 is ideal for checking hydraulic valve lifters *visually.*

Right: The model 111 has been expressly designed for 1954 Ford and Mercury engines. Both hands are free (away from exhaust manifold) to use adjusting tools—dial indicator registers exact clearance as engine idles.

Order from your dealer or jobber or...

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By any yardstick —

Transmission Life up 100%

Pulling away from the shovel with 50 tons on its back, this 1LLD Euclid heads for the dumping site at 25 mph. Thirty of these "Eucs"—each with two TORQMATIC DRIVES, hauled more than 1,000,000 yards a month for Western Contracting Corporation on the Fort Randall Dam project.

By any yardstick—miles, hours, ton-miles—truck transmissions *last twice as long* for Western Contracting Corporation since switching from direct-drive trucks to units equipped with Allison TORQMATIC DRIVES.

And "Rip" Collins, Project Manager, gives his TORQMATIC Converter-Transmission teams a major share of the credit for his perfect safety record in 1952: *No time lost due to accidents in 740,000 man-hours worked.*

Western's fleet of 30 Model 1LLD Euclids works 20 hours a day, 6 days a week. Making 700-900 trips per shift on a 3-mile round-trip run, these "Eucs" have hauled 6½-million yards of earth in six months' time. They climb 20% grades with 50 tons on their backs.

The TORQMATIC Converter absorbs harmful shock loads, protects drive lines, transmissions, differentials and other truck components. With no clutch pedal to push and only 3 forward speeds—instead of the usual 7 or 10—drivers quick-shift at full throttle and keep their eyes on the road, not on the gearshift.

If you are in the earthmoving business, do it better and at less cost with Allison TORQMATIC DRIVES in your units. Ask your equipment dealer, manufacturer or write:

Allison Division of General Motors
Box 894D, Indianapolis 6, Indiana

ALLISON TORQMATIC DRIVES

Unbeatable Team for Maximum Operating Economy

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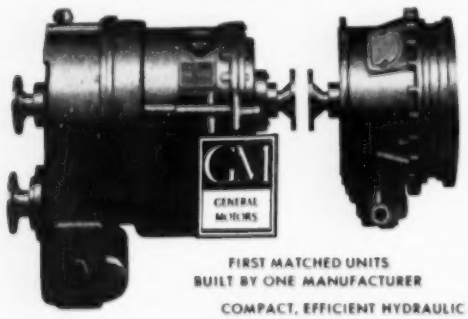
- **Cuts** driver training costs



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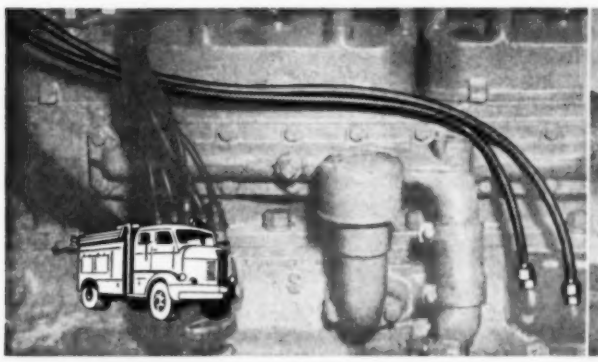
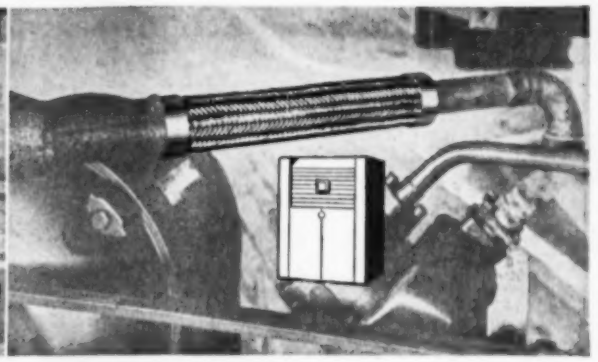
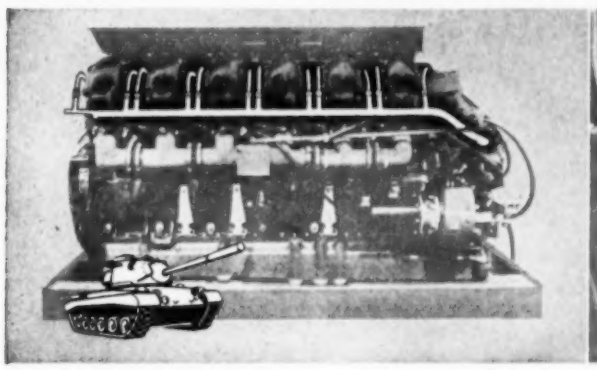
These 4 may end your design worries, too



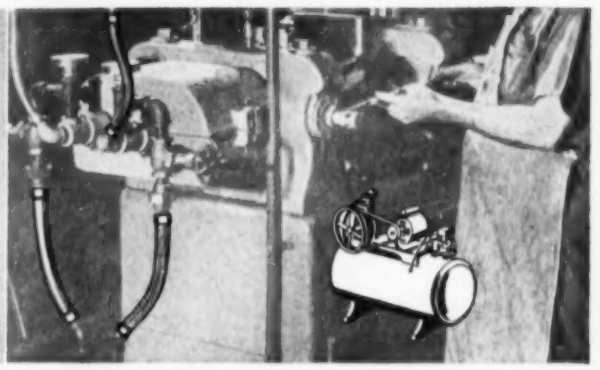
END FUEL LINE FAILURE. Four Wheel Drive's famous trucks stand up to roughest service. So do their Titeflex® oil and fuel lines. Automotive engineers specify Titeflex metal hose because it resists wear, vibration and corrosion —won't crack, bake or deteriorate under high engine temperatures.



ELIMINATE VIBRATION. To end vibration and prevent leaks around fittings, Uniflex seamless metal hose is installed between circulator coils and motor of GE's packaged air-conditioning unit. Made by Titeflex, Inc., Uniflex withstands critical stress and strain—is inherently leakproof.



BANISH IGNITION TROUBLE. Neither mud nor dust, snow, water or lubricants can affect the Titeflex-protected ignition leads of Continental engines in Patton M-48 Tanks. Also suppresses radio interference. Titeflex is a leader in developing ignition harnesses and metal hose lines for Army Ordnance tanks and vehicles. Titeflex quality pays off here.



CONVEY CRITICAL FLUIDS SAFELY. Cooling lines to rubber milling machine use flexibility of Titeflex to advantage. In other applications, tough, corrosion-and-wear-resistant Titeflex safely conveys oil, steam, gases, lubricants, brine, acids, oxygen and compressed air. Rugged, seamless Uniflex withstands extreme vibration, physical abuse and strain.

THERE'S ALMOST NO END to the engineering uses for Titeflex® seamed flexible metal hose or Uniflex seamless metal hose. From aircraft to automotive equipment—from drain lines to dental units—Titeflex simplifies design, construction, operation and maintenance. For types of hose, fittings, assemblies, applications and engineering data, keep our *new 48-page Metal Hose Catalog* No. 200 at your elbow. Use the coupon below to bring it and our design service without delay.

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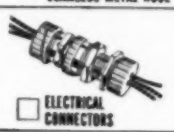

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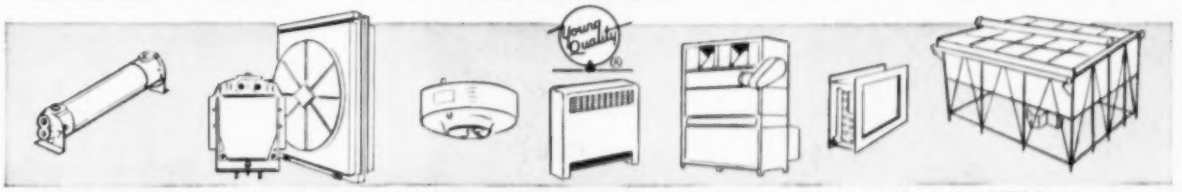

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Proper maintenance of equipment is a major problem for any railroad, and much time, effort and money are expended to keep power plants functioning at peak efficiency.

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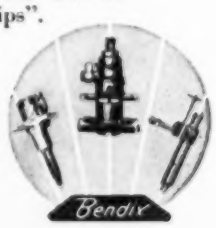
Send today for your copy of the Bendix bulletin, "How To Clean Spray Tips".



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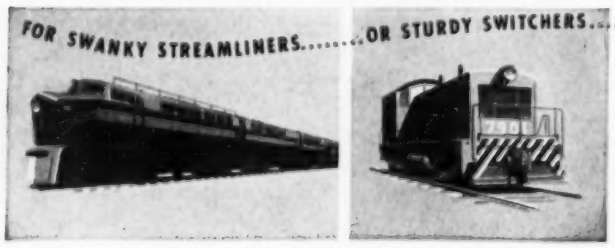

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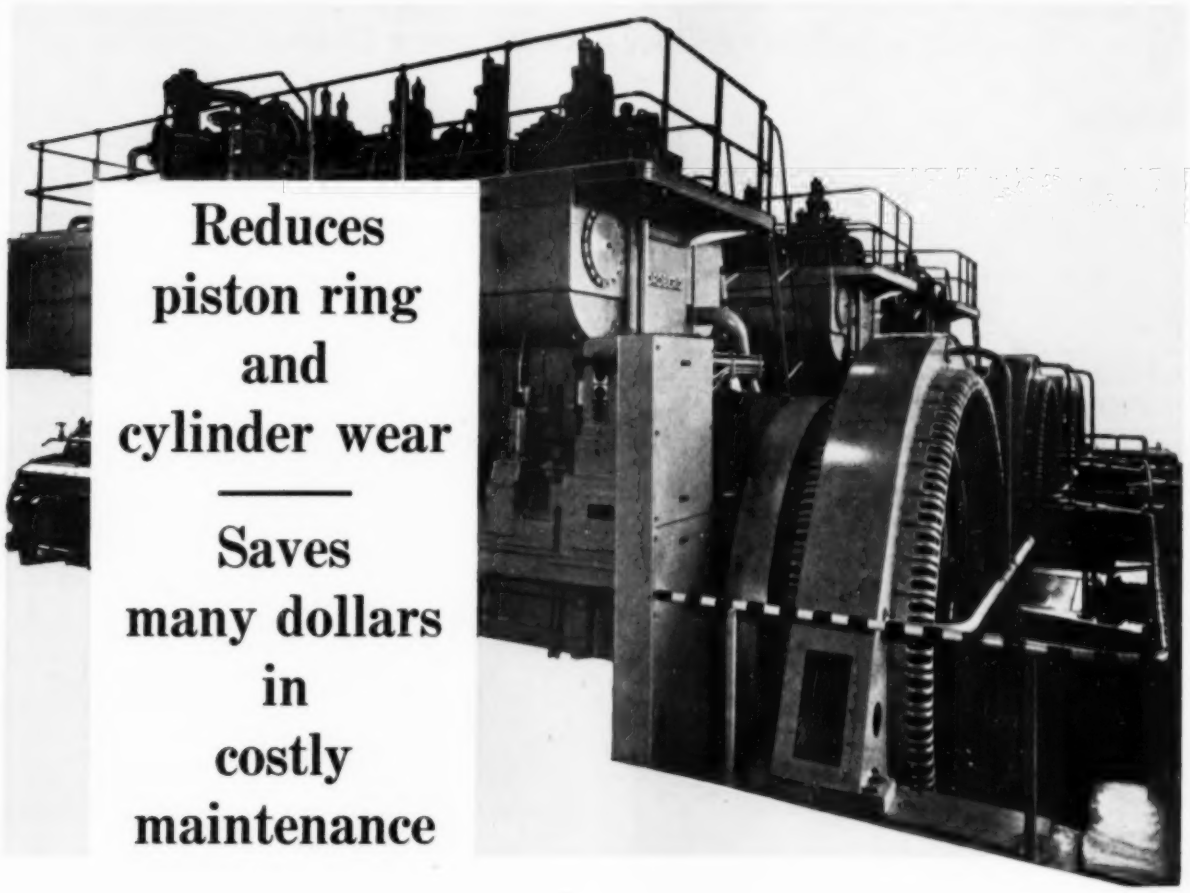
Shell Rotella Oil



Reduces piston ring and cylinder wear

Saves many dollars in costly maintenance

These dual-fuel engines in the Municipal Power Plant at Houma, Louisiana, supply dependable, low-cost electric power to the entire city. Shell Rotella Oil is the cylinder lubricant.

Here's just one of the many diesel power plants that depend on SHELL ROTELLA OIL for reduced wear of engine parts . . . lower maintenance cost.

The anti-corrosive action in Shell Rotella Oil combats the major cause of engine wear . . . cylinder and piston ring wear caused by acid action from the by-products of incomplete combustion and condensation.

Tougher lubricating film in Shell Rotella Oil gives cylinders and rings greater protection . . . minimizes wear. Its effective detergent-dispersant action prevents harmful deposits.

Write for technical information. See for yourself how Shell Rotella Oil can help reduce your engine maintenance costs.

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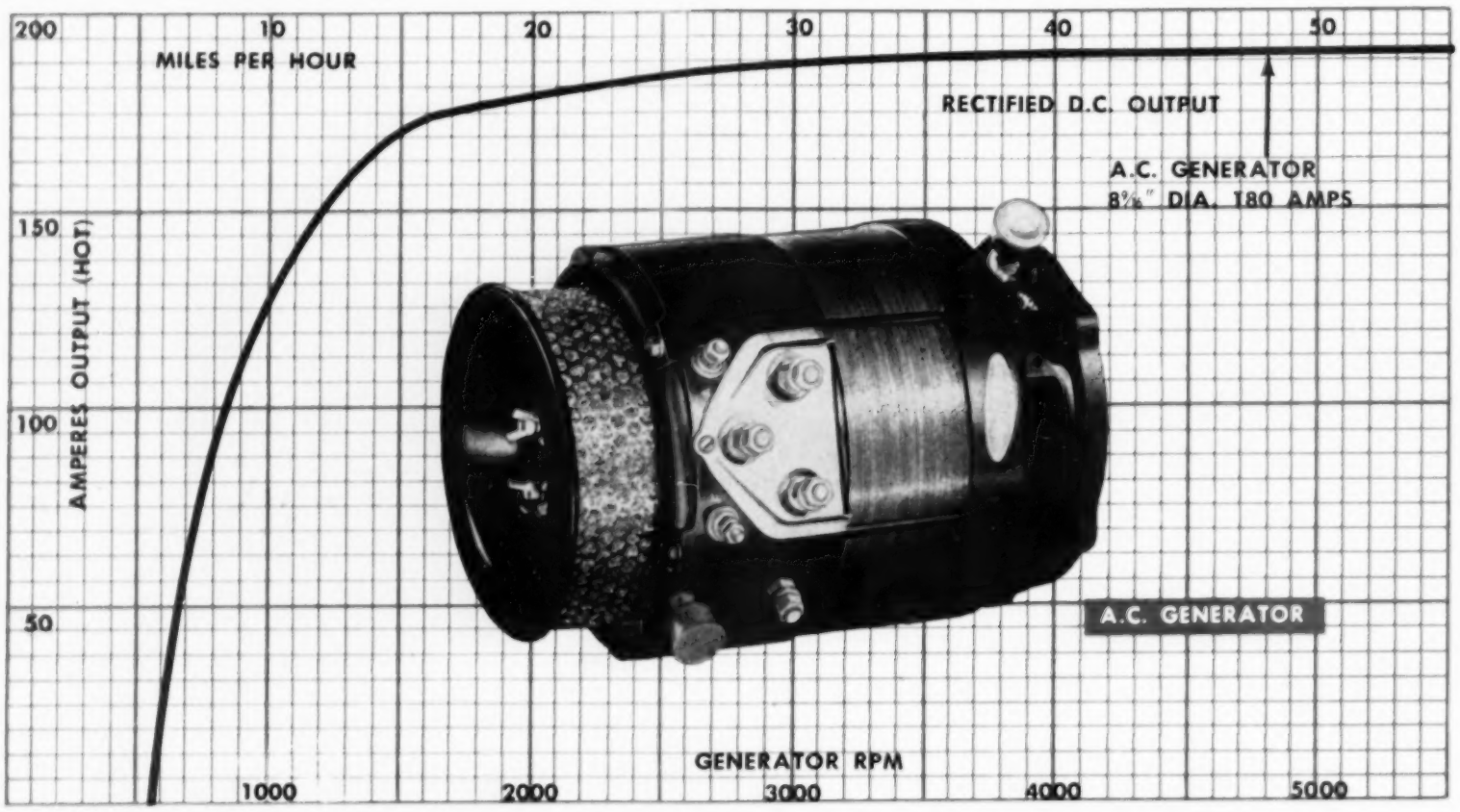
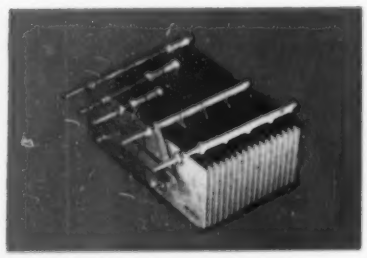
Power Packed and

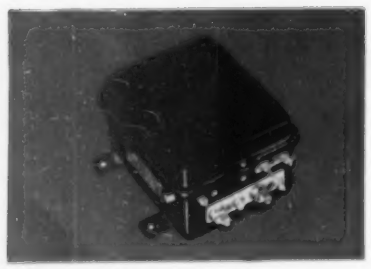
DELCO-REMY A. C. GENERATOR

Heavy-Duty 180-Ampere Output Capacity





Rectifier



Regulator

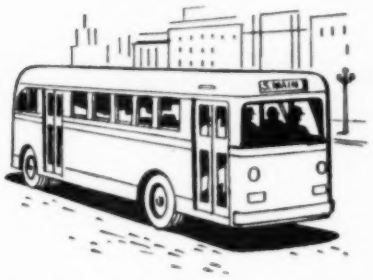
The Delco-Remy A.C. generator is the heart of a 12-volt A.C.-D.C. electrical system designed specifically for modern buses with fluorescent lighting and extra-heavy electrical loads.

Desirable performance characteristics include cut-in at approximately 550 generator rpm . . . maximum output of 180 amperes at approximately 2000 rpm. The new generator supplies not only alternating current for fluorescent lights but also ample direct current for the heaviest electrical loads coupled with lengthy engine-at-idle periods.

Impressive features of the new generator are its light weight, its very high output capacity, and its ability to operate over a wide speed range with greatest efficiency. Specify Delco-Remy electrical equipment on your new buses.

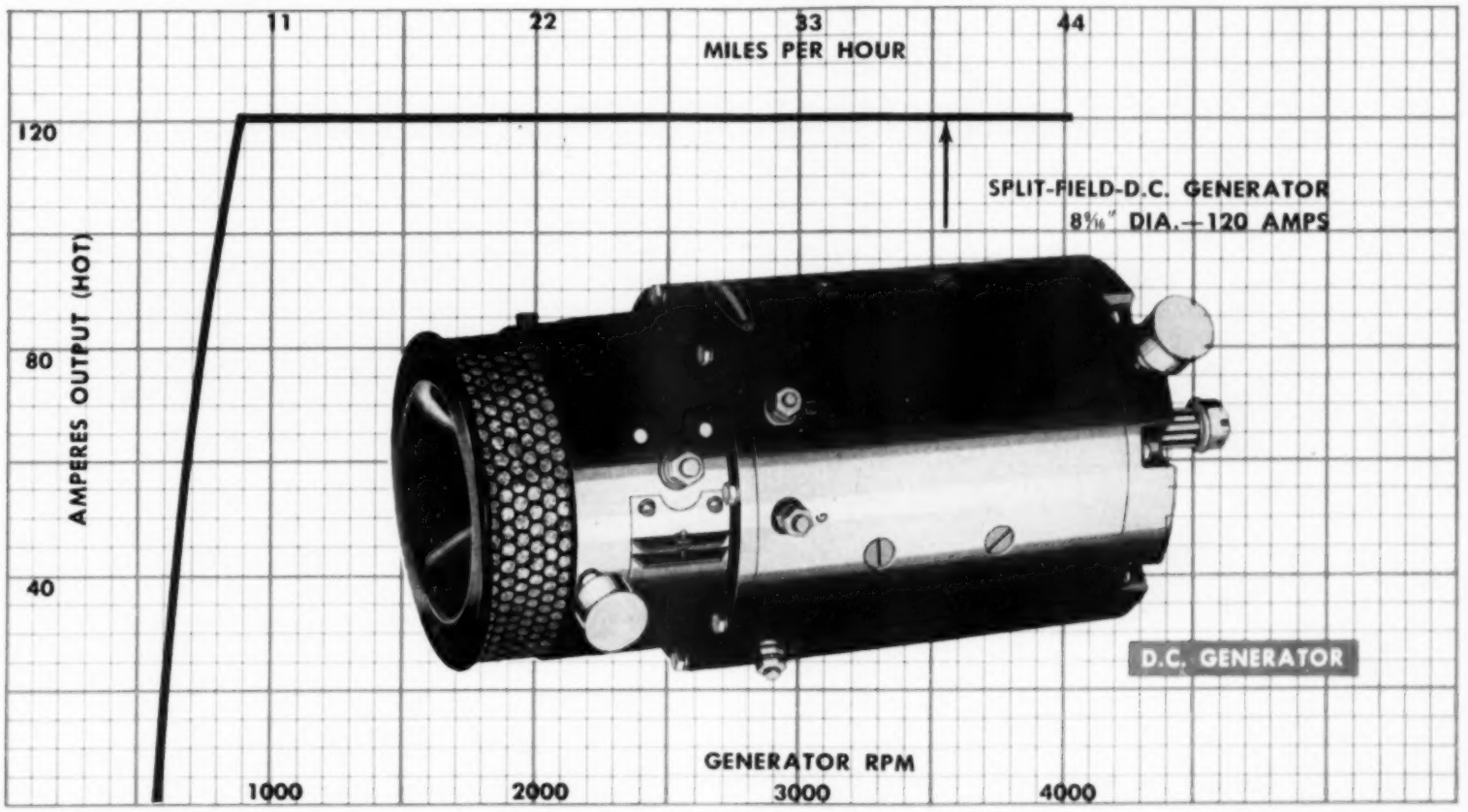
WHEREVER WHEELS TURN OR PROPELLERS SPIN

Right for the Job



DELCO-REMY D. C. SPLIT-FIELD GENERATOR

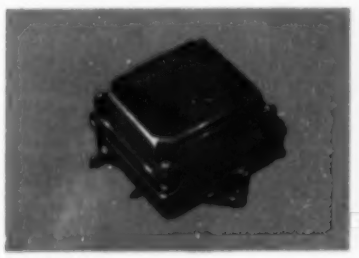
Heavy-Duty 120-Ampere Output Capacity



The Delco-Remy 12-volt split-field generator and its companion regulator are rugged and dependable—designed to meet the needs of transit buses having increased electrical loads coupled with a high percentage of engine idling time.

Desirable performance characteristics include low cut-in, high output at engine idle, and quick attainment of maximum output. Cut-in occurs at approximately 550 generator rpm; output reaches 70 amperes at approximately 700 rpm, maximum controlled output of 120 amperes above 850 rpm.

Operating benefits include reduced battery cycling, long battery life, and a simplified electrical system with sustained voltage—at no sacrifice in ruggedness or dependability. Specify Delco-Remy electrical equipment on all of your new buses.



Regulator

Delco-Remy

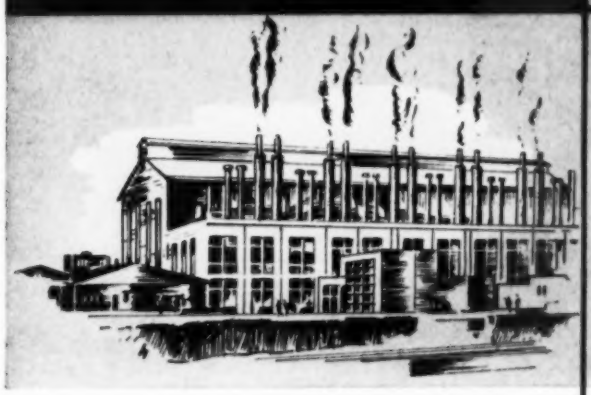
DIVISION, GENERAL MOTORS CORPORATION, ANDERSON, INDIANA

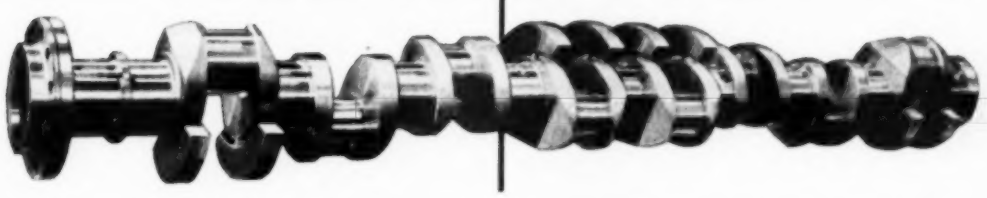
WHEREVER WHEELS TURN OR PROPELLERS SPIN

Dependable

Transmission of Power . . .

ERIE FORGE Diesel Crankshafts!





Here's the "Giant in the Diesel" . . . transmitting power that drives the modern railroad engines, pushes huge ships speedily and surely through the waves, or runs the power plants of business and industry. Erie Forge crankshafts are produced — from pouring of ingot to finished product — in our own plant. Every step is under the complete control of experienced craftsmen . . . one control, one responsibility. At Erie Forge you get the full benefit of our know-how and experience in the production of highest quality crankshafts — of exactly the right material to meet the most rigid requirements. Consult with Erie Forge on your next shafting requirements.

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"CENTRIFUGED HEAVY FUEL OIL SAVED US *$4500 A MONTH"

***Robert Dodd, Chief Engineer**
Clay Electric Co-op

"At our Keystone Heights, Florida, plant we have been burning residual fuels in our diesel engines for well over two years. We use a straight residual fuel and enjoy the full differential between its cost and No. 2 fuel. All fuel is centrifuged in a De Laval Heavy Fuel Oil Purifier. This centrifuge removed dirt from the heavy fuel at the rate of 13 to 15 pounds per 5 hours of operation.

"As a result of burning this De Laval centrifuged heavy fuel, we saved up to $4500 per month . . ."

De Laval Heavy Fuel Oil Purifiers are ideally suited to preparing heavy fuel for burning. They are designed so that purification takes place at a constant rate; there is no reduction in separating efficiency until the entire dirt holding space is full of solid material. This one feature alone makes it the outstanding means of cleaning up residual oil and enjoying the profits that such operation can bring.

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HEAVY FUEL OIL PURIFIERS

THE ENGINEER'S REPORT

DATA

LUBRICANT RPM Delo Oil R.R.

UNIT Diesel locomotive

SERVICE Mountain freight haul

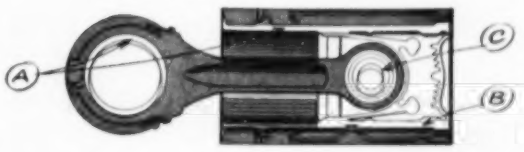
CONDITIONS Long, continuous grades to 1.6%

FIRM The Milwaukee Road

333,590 freight miles—only 0.0035 inch liner wear!

LUBRICATED WITH RPM DELO OIL R.R., this representative cylinder assembly was in good condition when pulled for regular inspection after 333,590 actual freight miles. Operation was on The Milwaukee Road's tough run between Othello, Washington, and Avery, Idaho. This liner, shown as it came from the engine, miked only 0.0035 inch wear, 0.001 inch taper, despite hard operating conditions—heavy loads, wide temperature variations, heavy grades, including one stretch of 20 miles of continuous 1.6 percent. Neither wristpin or bushing showed measurable wear.

How RPM DELO Oil R.R. prevents wear, corrosion, oxidation



A. Special additive provides metal-adhesion qualities...keeps oil on parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent scuffing of cylinder walls.

C. Special compounds stop corrosion of any bushing or bearing metals and foaming in crankcase.

FREE CATALOG: "How to Save Money on Equipment Operation," a booklet full of valuable information, will be sent you on request to Standard Oil Company of California, 225 Bush St., San Francisco, Calif.

RPM DELO LUBRICATING OILS

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

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FAMOUS LAST WORDS:

"they wouldn't dare"

That's what they said the day before Pearl Harbor. Remember? But by now you'd think people would have learned. Let's face it—we must be ready for disaster at any moment. It may be an atom bomb—or it may be a fire, a flood, a hurricane. It's only common sense to be prepared for it, whatever it is. Take these precautions TODAY:

- ☐ **Enlist the help** of your local Civil Defense Director.
- ☐ **Check contents** and locations of first-aid kits.
- ☐ **Send staff** to Red Cross courses. They may save your life.
- ☐ **Promote preparedness** in your community. Your local CD Director can show you how.

Set the standard of preparedness in your plant city—check off these four simple points NOW.

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

Ex-Lax, Inc.

POSITIVE DUST PROTECTION

for Small Engines and Compressors

NEW AMERICAN TYPE FS INTAKE AIR FILTER NOW AVAILABLE IN 50 TO 800 CFM CAPACITY RANGE.

Clean air is no longer reserved just for the "big boys"! The new American Type FS filter was designed with only one group in mind—those small stationary and portable engines and compressors of 50 to 800 cfm capacity.

Starting from "scratch", AAF engineers have built into the Type FS the five filter features essential for this service—(1) high cleaning efficiency, (2) large dust holding capacity, (3) easy maintenance, (4) simple installation *in any position or location,* (5) inexpensive media replacement.

Filtering Media "Combat Proved"

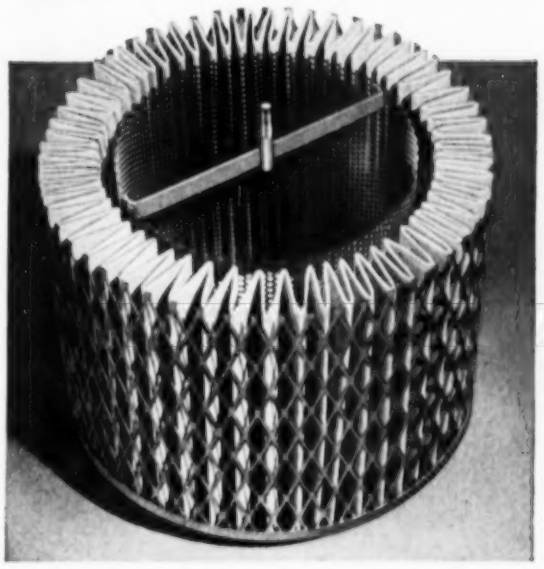
The filtering media used in the Type FS is a rayon flock—the same as selected for combat plane carburetor intake filters because of its light weight and efficient dust removal. The flock, which is bonded on a galvanized woven screen, may be cleaned quickly by washing in gasoline or any other solvent.

Operates Either Dry or Oilcoated

The Type FS may be operated either dry or oilcoated. When oiled its high cleaning efficiency is comparable to that of the dry filter and its dust holding capacity equal to that of a viscous type filter.

Uniform Efficiency

Whether operated oiled or dry, the Type FS filter's efficiency in dust removal is uniform over its entire life. With cleaning efficiency constant, full protection is assured at all times.



View of a Type FS filter with top section removed. The flocked screen filtering media is accordion pleated to provide maximum surface area. Inner perforated screen baffle serves to equalize air flow and protect against backfire.

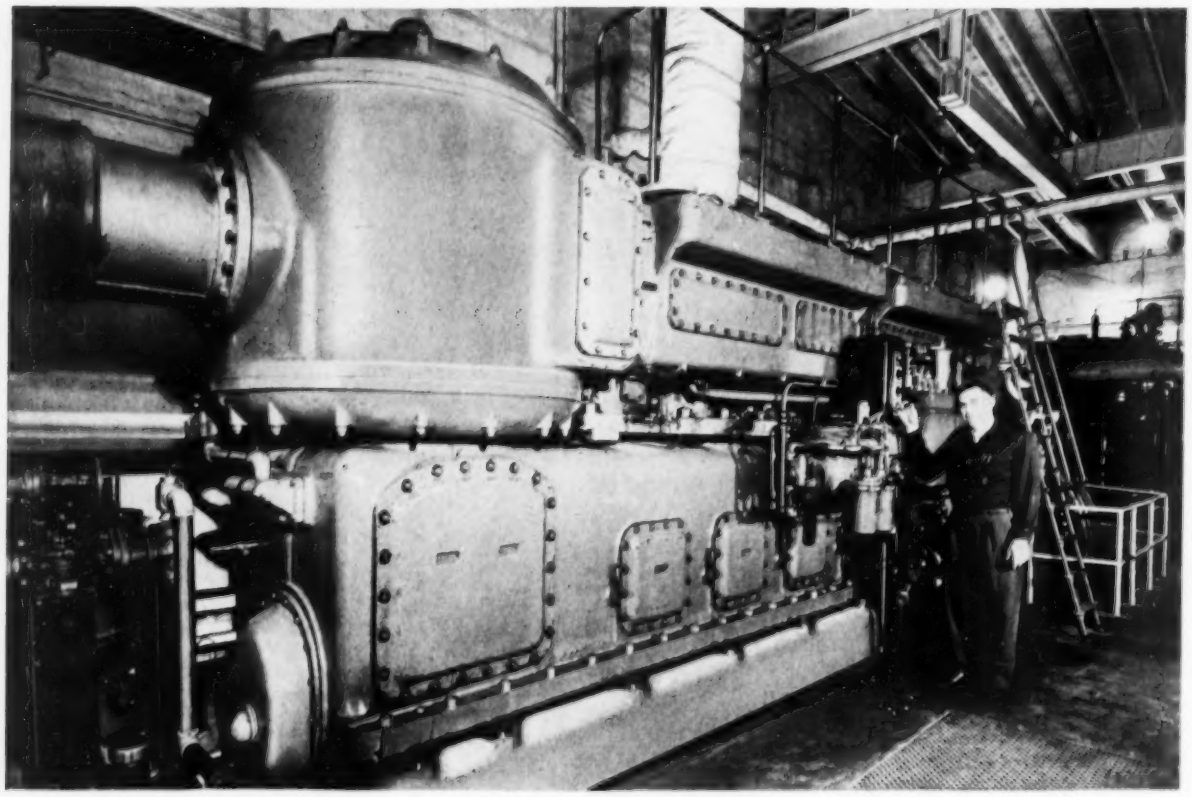
Available in 7 Sizes

The Type FS is made in seven sizes, giving a capacity range from 50 to 800 cfm. A weather shield is available for outdoor installation as protection against rain and snow.

Write today for Bulletin No. 135 containing complete data on the new American Type FS—the filter for small engines and compressors with a big capacity for work.

American Air Filter
COMPANY, INC.
408 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

"Our tests show Gascon® Oils best!"



. . . says A.E. Harms, CHIEF ENGINEER

YUKON MILL AND GRAIN COMPANY, YUKON, OKLAHOMA

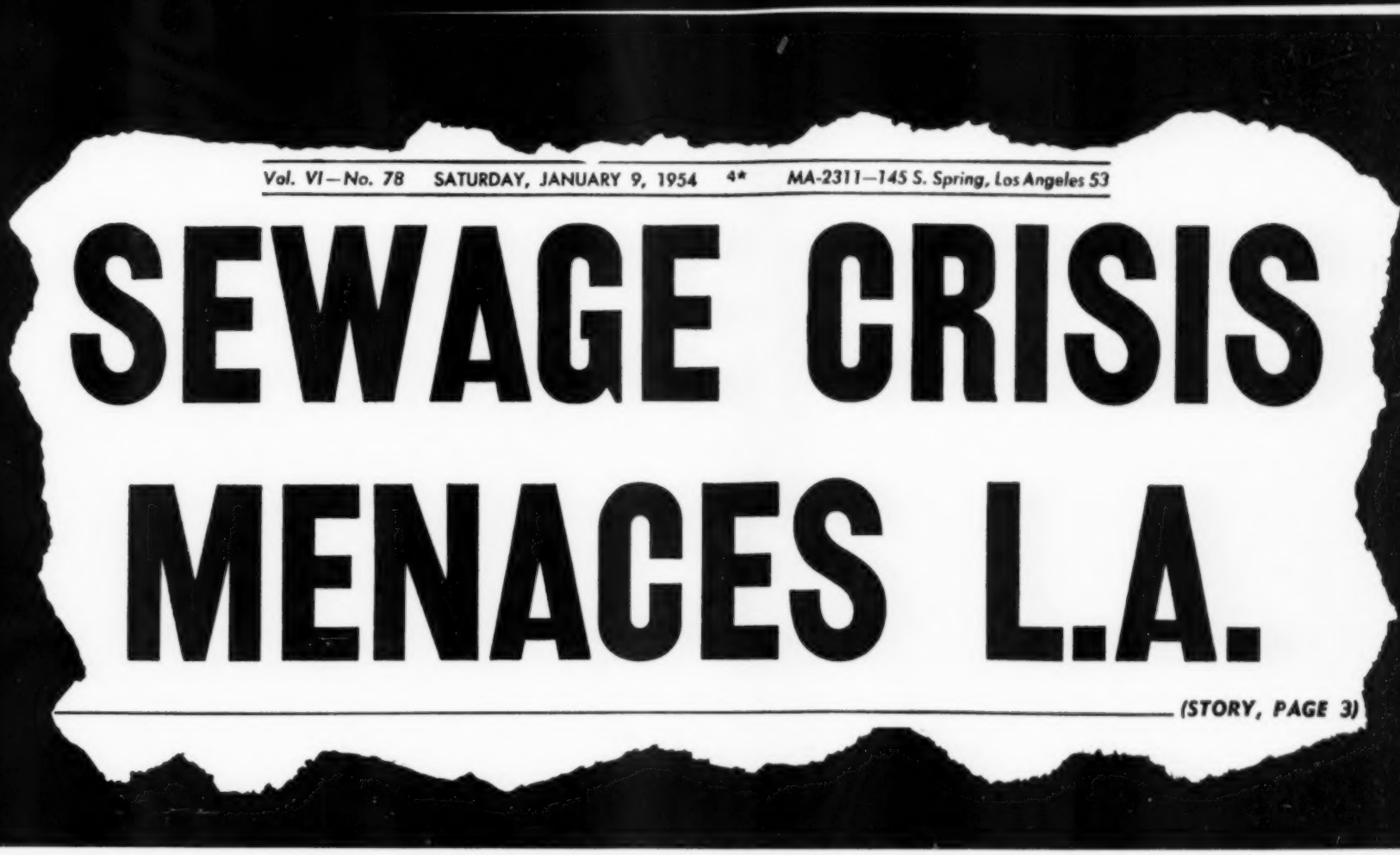
It's *doubly* important that the Yukon Mill and Grain Company's 5 diesels operate with as little trouble as possible. For this plant not only supplies power for the mill, but also for the City of Yukon.

Chief Engineer Harms writes, "When we changed to Sinclair GASCON Oil D-HD, the results were extremely satisfying – wear has been greatly reduced, varnish is gone from pistons and cylinders and stuck rings are a thing of the past. As you might expect, we now use Sinclair exclusively."

You too, can rely on Sinclair's full line of top quality diesel lubricants. Phone your local Sinclair representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR DIESEL LUBRICANTS

save wear and replacements



Front page headline of the Los Angeles Daily Mirror, January 9, of this year.

URGENT NEED FOR MORE SEWAGE TREATMENT PLANTS

This Is The Third And Concluding Article Outlining The Immediate Need For More And Improved Sewage Treatment Facilities In The Nation

By W. H. GOTTLIEB

HEADLINES that warn of a "Sewage Crisis" in an American city unfortunately are not uncommon. Actually, the Los Angeles region has spent millions on sewage gathering and treatment facilities and is further advanced than many populous areas. But the rapid population growth of our cities has created new problems and aggravated old ones and today there exists a tremendous need for sewage treatment facilities to protect public health, preserve recreational waters, and guard the economic welfare of major industries. It is in this climate of urgent need that we have been considering the role of sewage gas engines in the economical operation of treatment plants. These power units are unexcelled in efficiency and economy of operation: first, because they utilize as their sole or principal fuel the sewage sludge digester gas that is a waste product of the treatment process; second, because a high proportion of engine waste heat can be utilized to warm the digester tanks as required for efficient sludge digestion. We have noted one plant where a single 50 hp. engine saved $4,320 in a year, another where savings ran as high as $38,000 for a year's operation of a 465 hp. unit. In the giant big-city systems, power savings run into hundreds of thousands.

ACKNOWLEDGMENTS

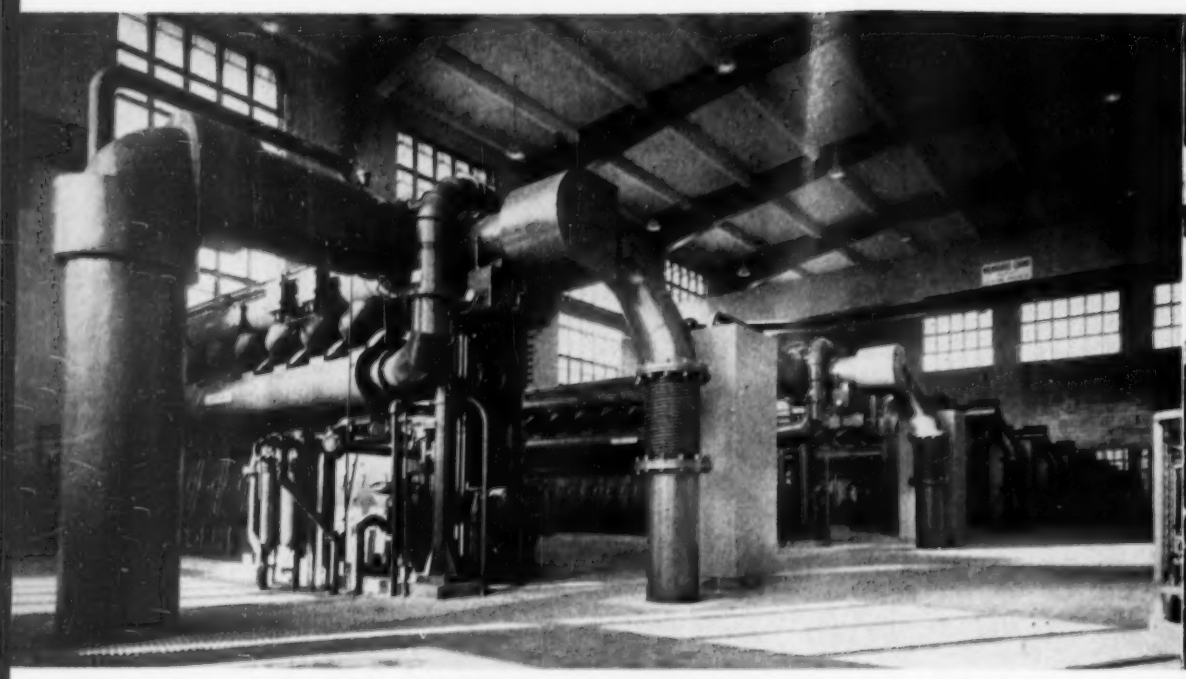
The author and the editor are deeply indebted to the following men for information and counsel in the preparation of this three-part discussion of why more sewage gas engines should be promptly purchased and installed:

Robert A. Rankin, Chicago Pneumatic Tool Co., who originated the idea behind these three articles and spent so much of his own time in helping us obtain the vital source material.

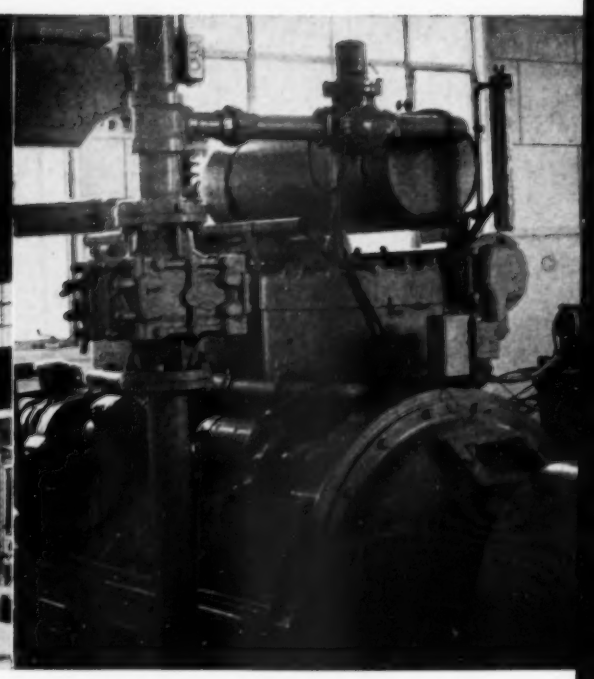
William F. Haddon, Enterprise Division, General Metals Corp.; W. E. Wechter, Volney M. Holmes, Stanley Bloss of Worthington Corp.; Carroll E. Dietle, Henry Barbour of Fairbanks, Morse & Co.; G. R. Kunze, Roots-Connersville Blower; R. G. Croyle, National Supply Co.; E. D. West, Climax Engine & Pump Mfg. Co.; E. R. Bonnist, Cooper-Bessemer Corp.; K. C. Lauster, senior sanitary engineer and officer in charge, North Atlantic Drainage Basins, Public Health Service, Department of Health, Education and Welfare; Jerry Cook, Caterpillar Tractor Co.; J. A. Chambers, Ingersoll-Rand Co.

The larger the population to be served, the more gas is available and the more certain the need and usefulness of sewage gas engines. But successful installations of small engines are numerous in the 10,000 to 20,000 population class. The flexibility of sewage gas units has been further increased by introduction of dual-fuel engines which run on gas with a small quantity of pilot oil and can function wholly on oil if the gas supply is insufficient. The engines are used to provide power for (in the order of their importance): 1. air compressors or blowers for aeration of sewage; 2. main sewage pumps; and 3. other pumps, lighting, miscellaneous power needs. Where practicable, there are advantages in direct or geared drive for blowers and pumps since this avoids the losses inherent in utilization of electric power. In the case of engine-driven pumps, engine speed usually is controlled automatically to match the volume of incoming sewage. With engine-driven blowers, usually engine governors are adjusted when air requirements rise or fall. There are many situations, however, when it is economical to use engine-driven generators. This is true in the very small plant where the engine supplements the major supply of purchased power. It is equally true in the very large plant where gas supply is sufficient to permit the sewage gas engines to carry the entire load of work.

But rigid adherence to rules of thumb are dangerous. Addition of garbage to the sewage can triple the yield of gas per capita. With the flexible



The six Superior Model 80, Elliott-Buchi turbocharged dual-fuel diesels in the Owl's Head, New York City, treatment plant. Each engine is rated at 1300 hp. at 327 rpm. and drives an 1125 kva. Westinghouse generator. On the foreground engine are seen the Purolator lube filters. Governors are Woodward.



The Buda diesel at the Colton, California, sewage treatment plant. It is a Model JL-1335, natural gas-sludge gas

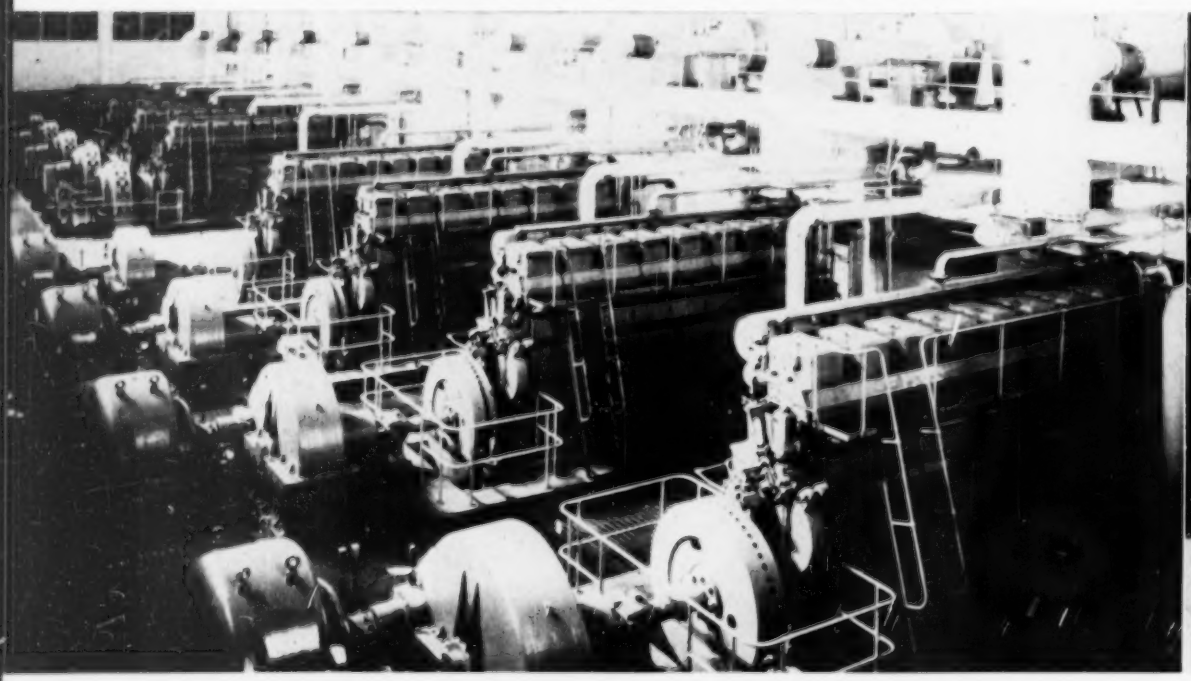
dual-fuel engine available, it is necessary always to consider how the quantity of sewage gas plus the cost of necessary supplementary fuel compares with the cost of alternate power sources. It should be instructive to examine briefly a group of notable treatment plants that incorporate sewage gas engines, see the type of engines chosen, the jobs assigned them, the fuel used, and the methods of utilizing waste heat.

1. Rockaway Sewage Treatment Works, put into service in 1953, is one of the newest in the great developing New York City system and a key plant in the development of Jamaica Bay as a recreational area. Sewage treatment includes screening, grit removal, aeration, settling tanks, primary and secondary sludge digestion. To power pumps, blowers, and other motor-driven equipment and to provide electricity for lighting, it was decided to install three identical Chicago Pneumatic Type 89 CPDF four-cycle, dual-fuel engines, each rated at 306 hp. at 600 rpm. Each drives a 200 kw. General Electric generator.

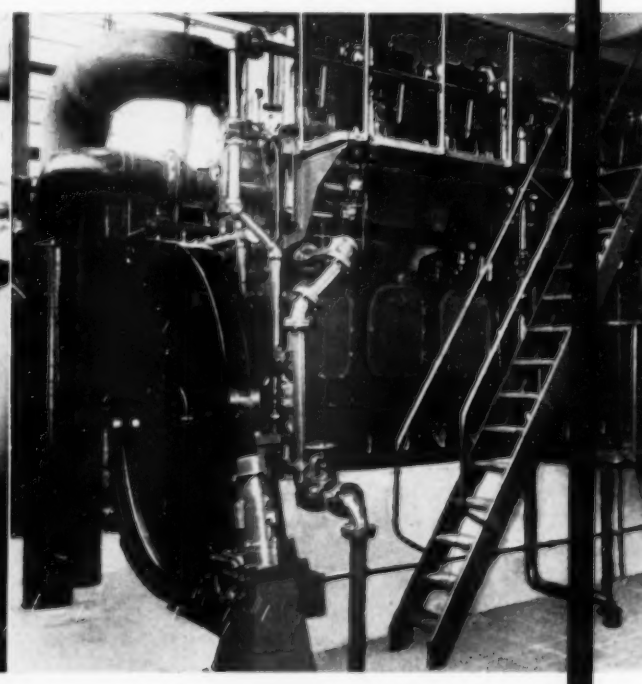
Dual-fuel engines had a number of advantages here. First, they could provide the required power immediately when the plant went into service, using fuel oil exclusively until the digestion process developed a supply of fuel gas. Second, Rockaway is a summer resort with a variable sewage volume and the dual-fuel engines could guarantee full power supply regardless of fluctuations in gas. The cost of oil to supplement the gas supply is small compared with the bills the city would have to pay if the plant were dependent on purchased power. Engine jacket water is pumped through heat exchangers to provide heat for the digestion tanks. Since this water is in turn used to cool the lubricating oil, waste heat from the lube system can also be recovered. Engine exhaust gases pass through silencers of the waste heat recovery type and provide heat for the buildings when needed.

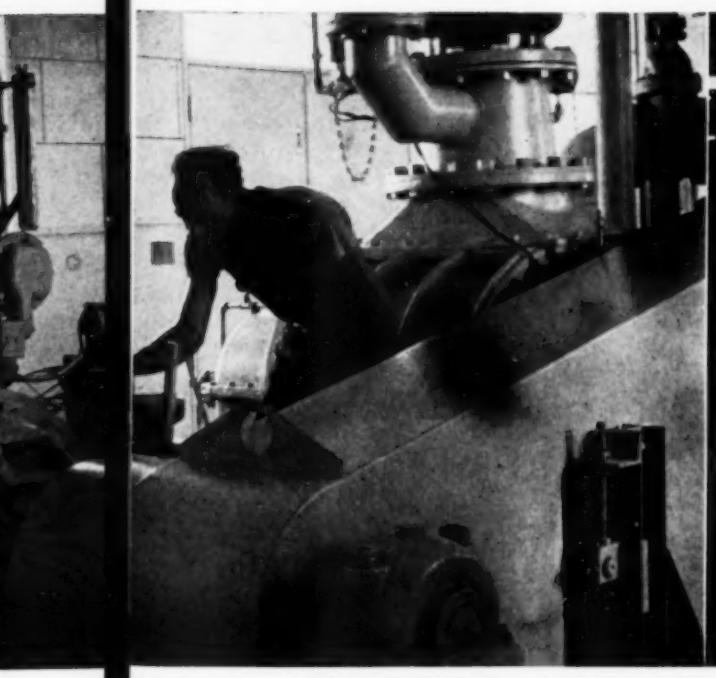
2. The San Diego, California, treatment plant put enlarged facilities into operation in mid 1950 to

The Hyperion plant at Los Angeles is one of the world's largest installations of its kind. This view shows nine 1688 hp. Worthington dual-fuel engines, four driving blowers and five driving generators. A tenth engine and blower (not shown) has been added.

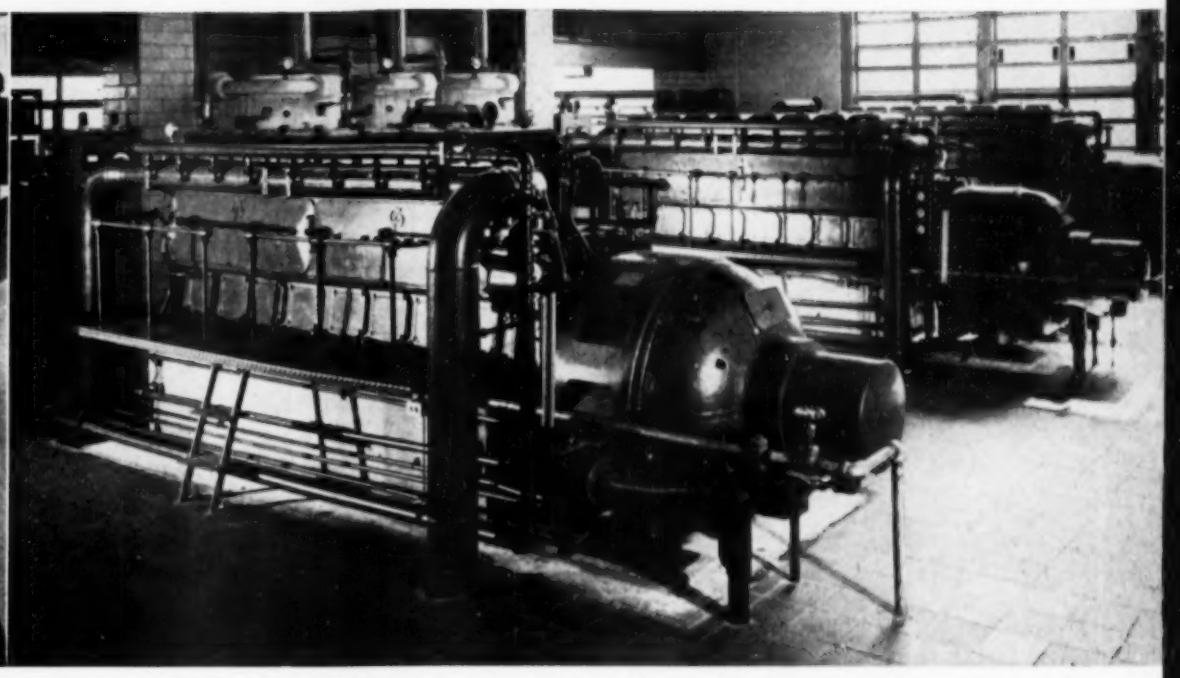


One of the 900 hp. Cooper-Bessemer gas diesels at New York's Hunt's Point sewage treatment plant. The engine has been equipped so that it can drive





fueled 50 hp. engine. The engine drives a blower which circulates air into the sewage thus speeding up bacterial action.



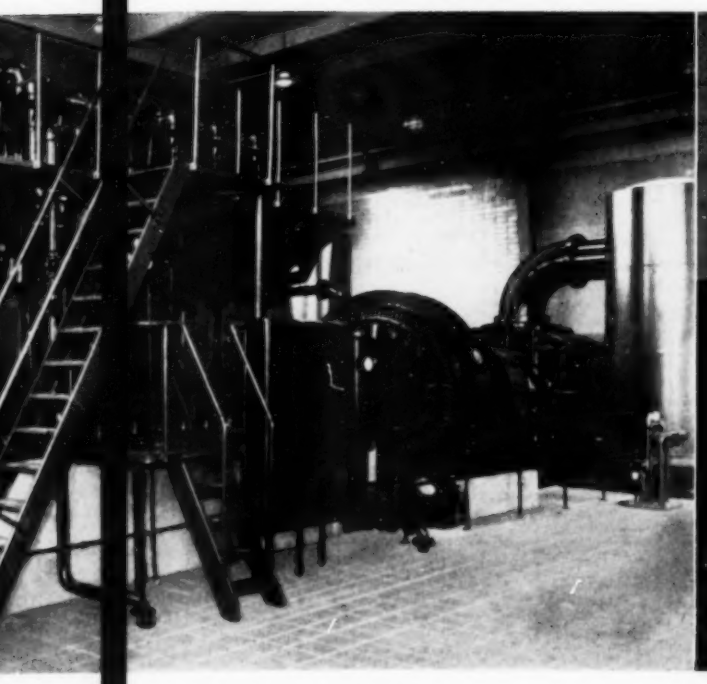
A view in the San Diego sewage treatment plant showing the Enterprise engines. There are six Model GSG6 spark-ignition gas engines here. Four of them drive Fairbanks-Morse sludge pumps through right-angle gears while the other two drive 7,500 cfm. Sutorbilt blowers. The engines are rated 350 hp. at 400 rpm.

serve a population of nearly half a million. Designed for an average daily sewage flow of 40 mgd. and peak flow of 70 mgd., this primary process plant includes grit removal, aeration, primary sedimentation, two-stage sludge digestion followed by elutriation, vacuum filtration and flash drying of sludge. For the major power requirements of pumping and aeration, the city installed six Enterprise Model GSG6 spark-ignition gas engines, each rated at 350 hp. at 400 rpm. Four of the engines drive Fairbanks-Morse sludge pumps through right-angle gears while the other two drive 7,500 cfm. Sutorbilt blowers. The engines normally operate on sewage digester gas but, should gas supply be insufficient, can run on butane-propane gas.

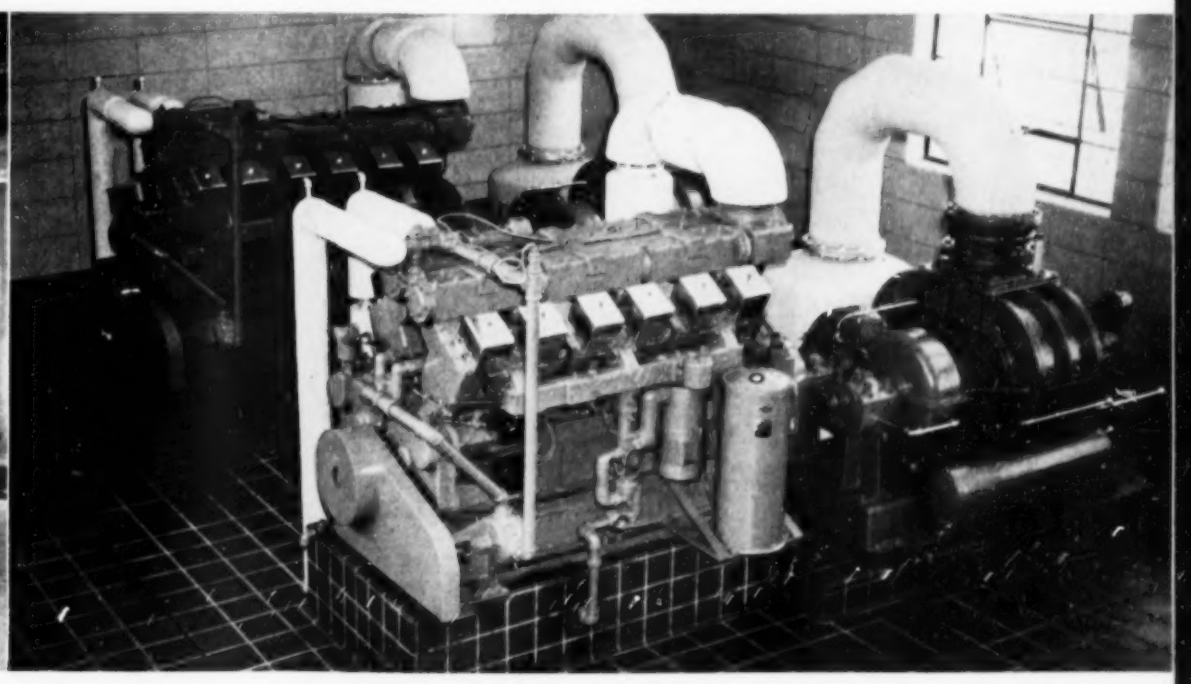
In the fiscal year ending June 30, 1952, the six engines ran a combined total of 27,330 engine-hours and consumed 98,930,000 cu. ft. of sewage gas and 27,429 gal. of liquified petroleum gas. In this period, total flow to the plant was 13,600,100,000 gal. of sewage. A feature of this plant is the Vapor Phase cooling of all six engines which has the double virtue of preventing condensation of corrosive sludge gas by keeping engine temperature above the dew point of the gas, and also of providing convenient low pressure steam for use in heating the sludge digester tanks. Waste heat from engine jackets and exhaust gases are combined at the vapor phase unit from which steam goes to the sewage sludge heater and steam condenser.

3. The huge Hyperion treatment plant serving Los Angeles has the world's largest installation of sewage gas engines, making it independent of outside power sources. This complete treatment plant includes comminution of coarse material, preaeration, primary settling, aeration and final settling. Sludge goes to digestion tanks, then to elutriation, filtration and drying. To provide compressed air for aeration and other plant uses, the plant has five Worthington Type SEHGO-8 supercharged dual-fuel engines, each driving through step-up gears a 40,800 cfm. DeLaval blower. To meet all other power needs, there are another five identical dual-fuel engines, each driving a 1,189 kw. Electric Machinery generator. Each of the ten

either the generator or the blower. The generator can also be used to drive the blower.



At Mishawaka, Indiana, two 12-cylinder Climax sewage gas engines rated 171 hp. at 600 rpm. drive directly a pair of 18 by 18 Roots-Connersville blowers Note the Honan-Crane oil filter mounted on the side of the engines.



engines is rated at 1688 hp. at 360 rpm., making a total of 16,880 hp. Until the new digest tanks developed enough sewage gas, the dual-fuel engines ran on oil, then switched to gas with a small quantity of oil as pilot fuel. The fuel gas is compressed and stored at 50 lb. pressure and delivered to the supercharged engines at 15 lb.

Hyperion uses Vapor Phase cooling for all the engines. In all but two of the engines, water from the engine jackets is further heated in Maxim exhaust heat recovery silencers and a portion of the water is flashed to steam. This low pressure steam is injected directly into the digesters to heat the sludge. Treated water is used for makeup. Two of the engines are equipped with exhaust heat recovery silencers of the high pressure type which develops steam at 75 psi. for plant use. When high pressure steam is not required, it can be reduced to 10 psi. for sludge heating.

4. The Owl's Head plant serves a million New Yorkers, and is designed to handle an average sewage flow of 160 mgd. This is the first plant to use the modified aeration treatment method in which the primary settling tanks are eliminated. Sewage, after screening and grit removal, flows through an aerated channel to the main aeration tank, then to the final settling basin. Sludge goes to eight 103-ft. digesters. All blowers, pumps and other equipment in this big modern plant are motor-driven and all power is supplied by six Superior Model 80, turbocharged dual-fuel diesels. Each engine is rated at 1300 hp. at 327 rpm. and each drives an 1125 kva. Westinghouse generator. Here again, dual-fuel units made full power available as soon as the plant was put into service and switched over to sewage gas as it developed in the digesters. It is estimated that there will be enough gas to supply 90 percent of the plant's power requirements with oil automatically making up the difference. Engine jacket water, lube oil and exhaust gases all contribute heat to warm the digesters. Jacket water from the engine passes through waste heat boilers where it picks up heat from the exhaust, then goes to sludge heat exchangers, then back through the lubricating oil coolers to the engines.

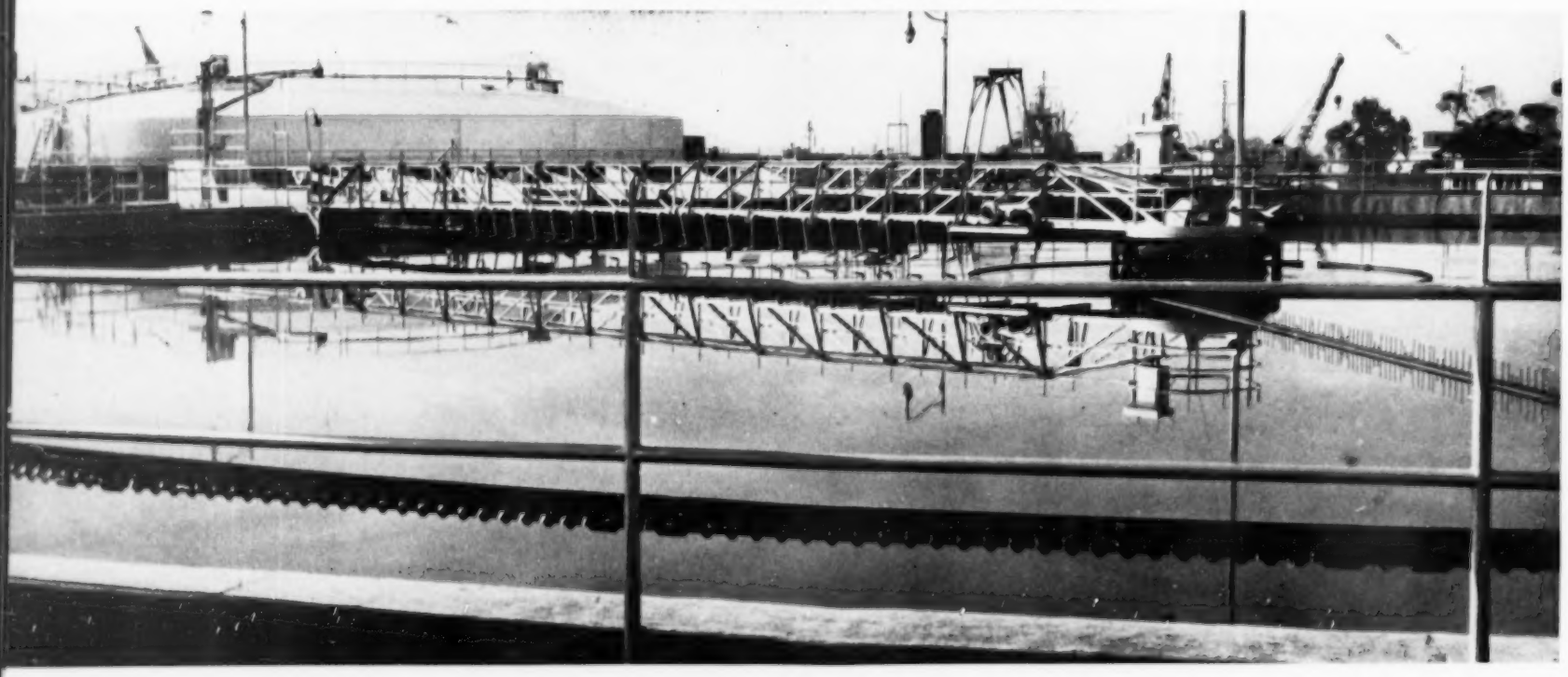
5. Still another plant in New York's new system is the Hunt's Point treatment plant serving a population of about 770,000 with a design capacity of 120 mgd. This installation, protecting the waters of the East River and Long Island Sound, eventually will have 150 mgd. capacity to serve 961,000 people. This plant employs screen and grit chambers, primary sedimentation tanks, four aeration tanks, 16 final sedimentation tanks, four sludge digestion tanks and four sludge separation tanks. A flexible power supply is provided by four Cooper-Bessemer Type LS-8 gas diesels, each rated at 900 hp. Two of the engines are direct-connected to 21,000 cfm. blowers. The other two can drive either blowers or 840 kva. generators through a common drive shaft with disconnect couplings. Not only can each of these engines drive either blower or generator, but the generators can be used as a motor to drive the blowers. Needless to say, engine waste heat is utilized to heat the digesters.

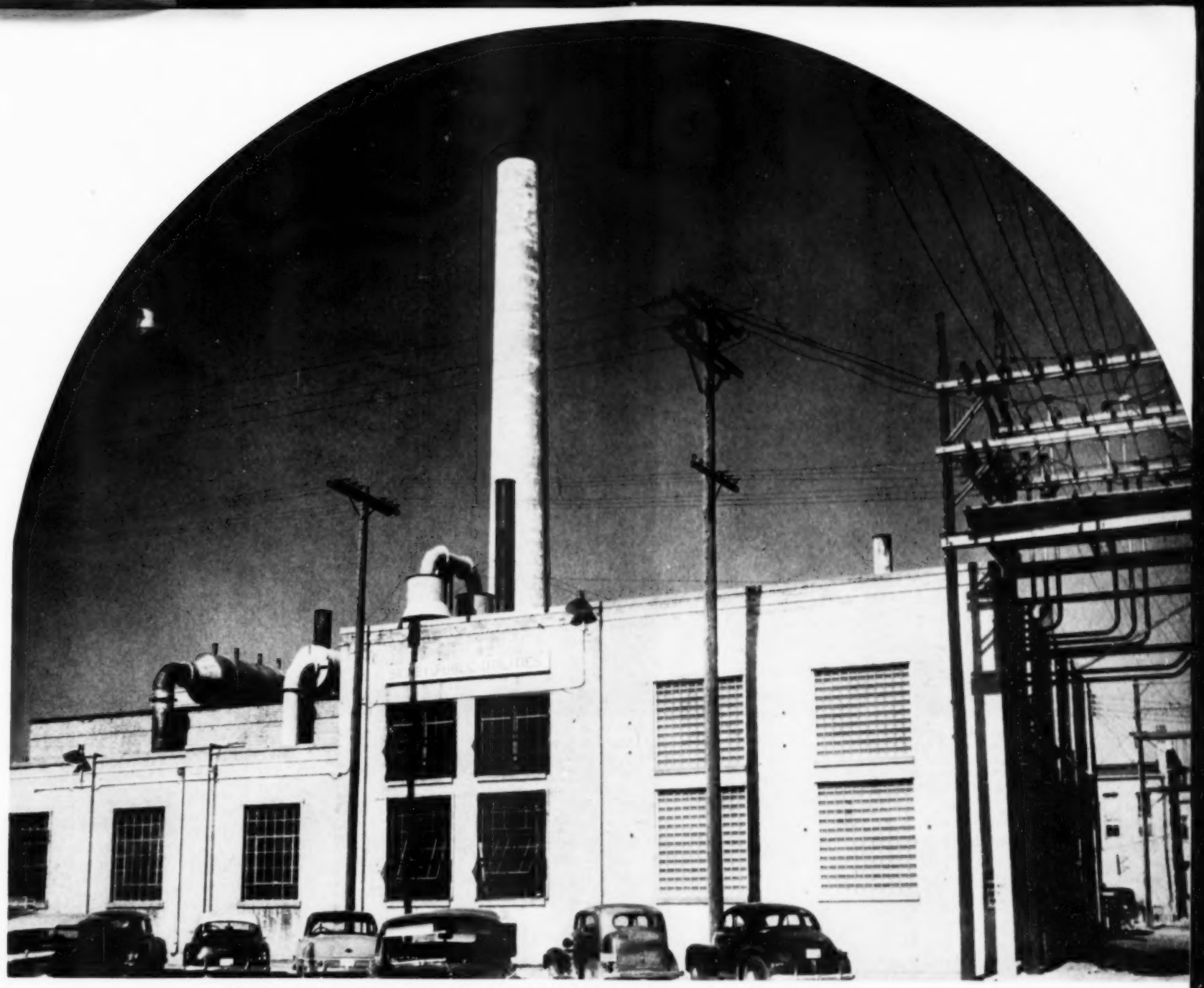
6. The Lansing, Michigan, sewage treatment plant has an unusually flexible power supply for blower operation. When constructed in 1938 to handle a normal flow of 9 mgd. and a maximum of 18 mgd., the plant was provided with three Roots blowers, one driven by a 240 hp. Worthington spark-ignition sewage gas engine, the other two by electric motors, providing a total air capacity of 13,000 cfm. When the plant was enlarged recently to a normal capacity of 20 mgd. of sewage and 30 mgd. maximum, it was decided to install dual-fuel diesels. The new engines are two Fairbanks-Morse Model 31AD8½, two-cycle dual-fuel diesels, each rated at 325 hp. at 514 rpm. Each drives a 7,000 cfm. Roots-Connersville blower. These engines normally operate on sewage gas with a small quantity of oil as pilot fuel.

The advantage of dual-fuel engines has been evident in this plant. First, they provide a fully independent power supply. Second, they give much more economical power than purchased power for the motor-driven blowers which they have relegated to stand-by. Third, in this plant where there are heavy demands for gas for other purposes and where gas supply has not reached a point where it is always available for full engine operation, the dual-fuel units switch automatically to oil. The Lansing plant includes grit removal, pre-aeration, primary settling, aeration and final settling. There are ten sludge digesters, two elutriation tanks, vacuum filters and dryers. Jacket water from the engines is further heated in Maxim heat recovery silencers, then pumped to the sludge heat exchangers, picking up heat from the lube coolers on the way back to the engines.

All these plants, and dozens more we could cite, are examples of sound practice in the provision of power for treatment plant operation. They are indicative of the wide variety of efficient, heavy-duty sewage gas engines available and of the varied ways these power units can be employed best to meet individual situations. All these plants are evidence of the efficiency and economy of engines that burn sewage gas and the important savings that can be effected. This is a time of growing awareness of the necessity for pollution control and every effort should be made to achieve efficient and economical treatment plant operation. Sewage treatment engineers and engine builders owe it to themselves and to the public they serve to work for improved pollution control and to determine in each individual situation the services that can be rendered by sewage gas engines.

A thickener settling tank at San Diego. The raking mechanism's travel is activated by a motor driven gear running against the rack shown in foreground.





Exterior of Sidney, Nebraska, Municipal Light & Power Plant. Located one block from the main street. American air filters and Maxim silencers on roof to the left.

SIDNEY, NEBRASKA

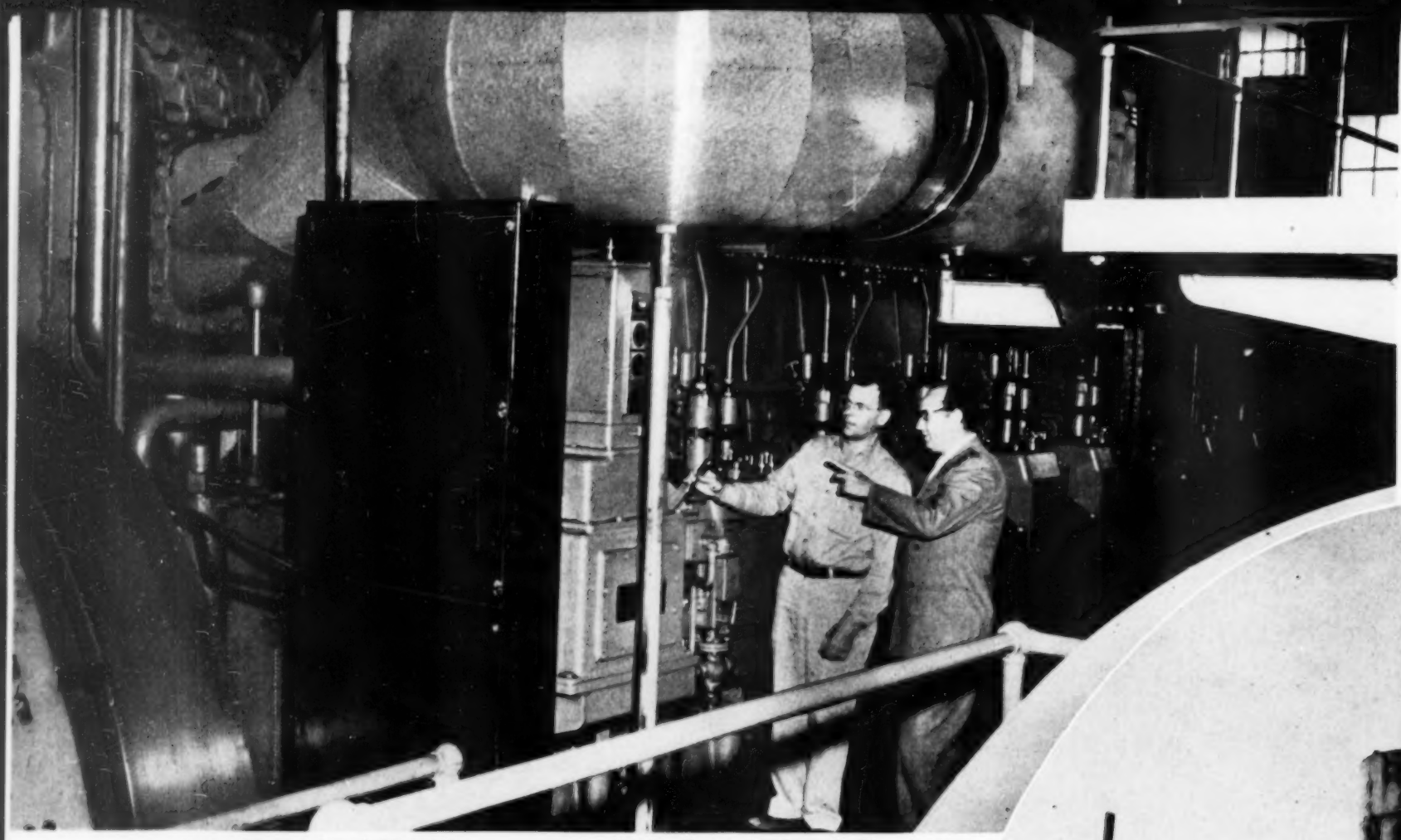
3440-Horsepower Nordberg Duafuel Operates on Natural Gas and Pilot Oil at Cost of 2.9 Mills Per Kilowatt-Hour Generated

By ARMOUR BOESE*

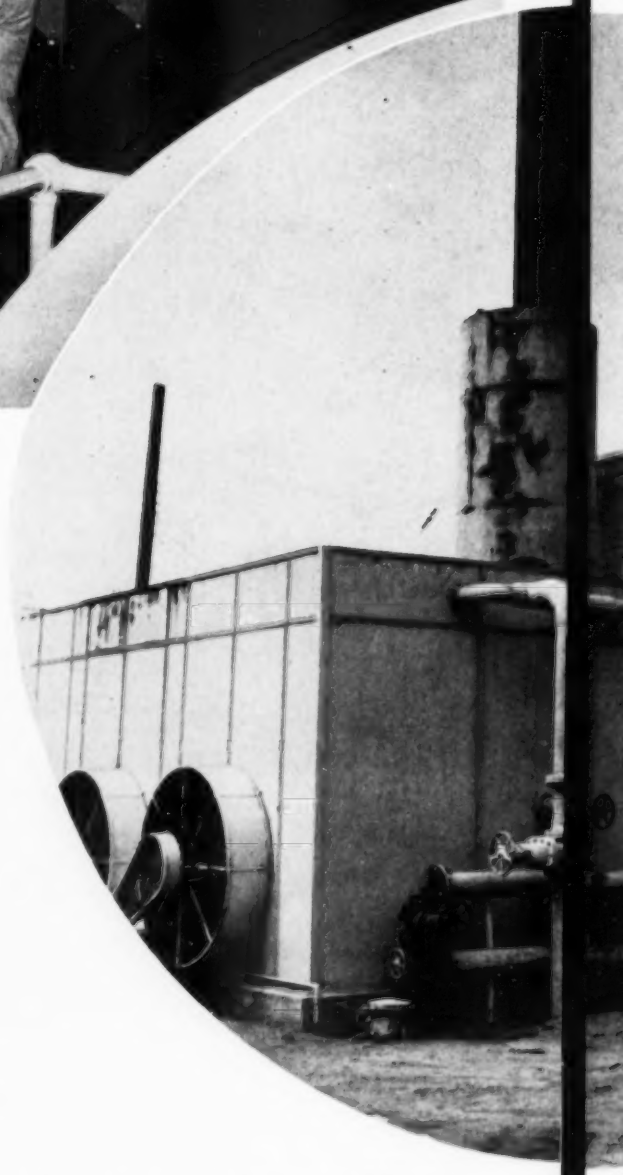
THE largest diesel in the state of Nebraska is in service in the Sidney municipal power plant, producing electric power at a total fuel cost of 2.9 mills per kilowatt-hour. This unit, a Nordberg Duafuel engine, has a sea level rating of 3,440-hp. at 225 rpm. Put on the line in November, 1952, the new engine already had run more than 4,000 hours as of June 8, 1953. In seven months, the Nordberg produced 5,915,400 kwh. Total fuel consumption was 67,138,000 cu. ft. of natural gas and 42,580 gal. of pilot oil. It should be noted that the gas has a low heat value of 815 Btu. per cu. ft.

**Plant Engineer, Sidney, Nebraska.*

The first power generating plant in Sidney was a private venture in 1906 with two 225 hp. dc. Habercorn steam units. These were sufficient to serve the electrical needs of the town and the U.P. railroad as well as to steam heat the business district. The City purchased the plant in 1915, installed two Murray Corliss engines and changed the system to ac. By 1921 two more engines were in use giving a total of 700 hp. Demands for lower rates led to consideration of steam turbines but instead the plant was sold in 1929 to Western Public Service Co. who extended their 33,000 volt transmission line to the city. A 1200-hp. F-M diesel was installed in 1931, and in 1942 a used 480-hp. Worthington diesel was purchased and added in order to meet the critical demands of the newly established Sioux Ordnance Depot. In January 1942, Western Public Service Co. sold its property to Consumers Public Power District and in May 1944 the City of Sidney bought the plant and distribution system. Increased demands on the system made it necessary to add more generating equipment and in 1947 a 1600-hp. F-M Model 33 diesel was installed and three of the steam units removed. A 1980-hp. Fulton diesel was added in 1949 and the last of the steam engines removed.



Armour Boese, author of this article (left), and Virgil Knowles, City Manager, discuss operating features of new 3440 hp. Nordberg two-cycle low pressure Duafuel engine.



Maxim silencer, American air filter and Diesel Service Co. cooling tower serving the new Nordberg two-cycle, eight cylinder Duafuel engine.

Oil was discovered near Sidney in 1950 and the city began to grow rapidly. In November 1952, a 3440-hp. Nordberg Duafuel was placed on the line, giving additional capacity and taking advantage of the natural gas available in the area. The 480-hp. Worthington diesel was removed. Previously, two of the older engines were switched to gas. The 1980-hp. Fulton was converted to dual-fuel operation in April 1951, and the 1600-hp. F-M converted in October of the same year. The plant now has the three units totalling 4685 kw. operating on natural gas and fuel oil, and the old 1200-hp. F-M of 832 kw. capacity on straight fuel oil for standby only. The new 3440-hp. Nordberg low pressure Duafuel engine, rated at 3060 hp. at 4091 ft. altitude of the Sidney plant, is the largest engine in use in the state. It is a two-cycle, 8 cylinder, 21½ in. bore by 31 in. stroke engine operating at 225 rpm. with an integral engine-driven scavenging blower mounted on it.

Table I: Operating Statistics, Nordberg Duafuel Engine—Sidney, Nebraska

Month	Kwhr.	Cu.Ft. Gas*	Gal. Oil**
November, 1952	542,600	5,506,000	9,050
December	906,400	8,917,000	6,610
January, 1953	892,400	10,071,000	5,960
February	852,000	9,862,000	5,370
March	953,000	11,386,000	5,800
April	771,000	9,279,000	3,940
May	791,000	9,594,000	4,620
to June 8	207,000	2,523,000	1,230
	5,915,400	67,138,000	42,580

Total hours operation to June 8: 4010.

Lube oil consumption average: 7200 hp. hr./gal.

Fuel cost 2.9 mills/kwhr.

*Gas volume at 12.95 psia. and 60° F., LHV 815 Btu./cu.ft.

**Fuel oil HHV 139,880 Btu./gal.

Natural gas costing 20.5 cents per thousand cubic feet is supplied to the plant at 60 pounds pressure where it is reduced to 20 pounds pressure, cleaned, and metered to each engine. The low heat value of the gas is 815 Btu. per cubic foot at 12.95 pounds pressure, the purchase base. The gas is then admitted through intake valves in the cylinder head as compression starts and after the cylinder has been scavenged and filled with pure air. After the mixture of gas and air is compressed to about 500 pounds pressure, pilot fuel oil is injected into the cylinder by the same pumps and nozzles which serve in full diesel fuel operation. This pilot oil ignites from the high temperature present and, in turn, ignites the gas-air mixture. The engine is capable of operation on gas with small quantity of pilot fuel oil, on fuel oil only, or on intermediate proportions of each fuel. In event of low gas pressure, the engine will automatically shift over to fuel oil operation.

The 3440-hp. Nordberg is equipped with safety devices which shut the engine down if fuel oil or lube oil pressures fail. An elaborate signal and control panel also warns of abnormal cooling water temperatures, gas pressure, air pressure, lube oil pressure and temperature, and fuel oil pressure. No. 2 fuel oil costing 8 cents per gallon is delivered at a Union Pacific siding to underground 55,000 gallon oil storage tanks. The fuel oil is transferred to 500 gallon day tanks, then flows through a full pressure type oil filter before going to the pumps and injection nozzles. Based on current fuel prices, the new engine is producing power for a fuel cost of only 2.9 mills per kwhr. The average heat rate to date is 10,270 Btu./kwhr. which is considered satisfactory for the altitude at Sidney.

The Duafuel operation results in less lube oil consumption than experienced previously on straight fuel oil operation. About 7200 hp. hrs. are now obtained per gallon. Lube oil is supplied to the engine cylinders by separate visual forced-feed lubricators. The lube oil from the crankcase is cooled by a shell-and-tube type heat exchanger, filtered, and purified as necessary. Jacket water and oil cooler water is circulated in a closed cycle through coils in an evaporative type cooling tower located outside the building. Any make-up water is treated with a zeolite type softener to reduce the hardness. Because of the close proximity to the business district, good exhaust silencers are a must, as are air filters on the intake air supply. At the time of the last addition, a complete new switchboard was also installed in the plant and the old one removed. This was accomplished without interruption of service to customers.

The plant is being operated on a sound financial basis and is showing good profit. At the end of the last fiscal year, April 30, there was $75,000 in operations and maintenance reserve account, $41,000 in the light and power fund, and $39,000 in the active bond account. City Manager Virgil Knowles states the earnings and reserve picture is such that it should be possible to begin pre-paying bonds during 1953. If earnings remain as good as at present, the plant could be debt free by 1960 although existing plans call for final payment in 1969. Retirement of all bonds depends, of course, on whether the present plant proves adequate in the intervening years. In the past it has been necessary to add more generating equipment at frequent intervals. This is one reason why the city decided to install as large an engine as the new Nordberg.

Since 1944, when the City took over the electric utility, the peak demand has increased from 1060 kw. to 2800 kw. in December 1952, an increase of 164 per cent or an average of 20½ per cent per year. At the same time the total generation has increased from 4,197,540 kwhr. to 12,114,750 kwhr. or a 188 per cent increase. The population has increased rapidly since 1950 when the census showed 4900 inhabitants. Best estimates in June 1953 place the population in excess of 7,000 and growing daily. There are 2253 electrical customers now being served in the city.

List of Equipment

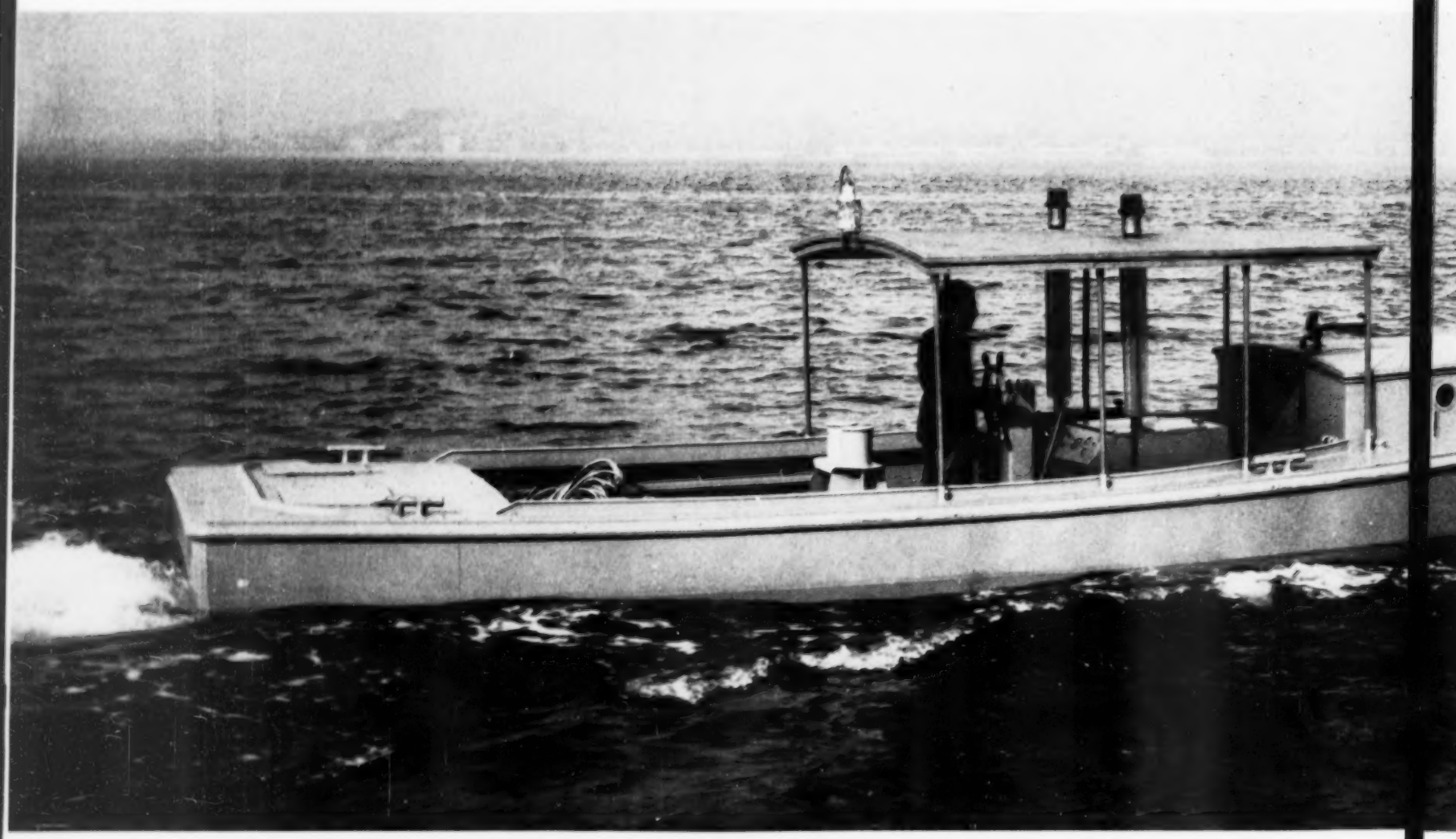
Engine—3440 hp. Nordberg Duafuel 2-cycle, 8 cylinder, 21½ in. bore x 31 in. stroke, 225 rpm., Model TSGL-218-31, rated 3060 hp. at 4091 feet elevation. Nordberg Manufacturing Company.
Generator—2160 kw., 60-cycle, 2400/4160 volt, 2700 kva., 225 rpm. Westinghouse Electric & Mfg. Co.
Exciter—30 kw., 125 volt, 1150 rpm., belt-driven. Westinghouse Electric & Mfg. Co.
Governor—Woodward.
Scavenging blower—Roots-Connersville.
Fuel oil—CO-OP Refinery.
Fuel oil filter—Nugent.
Fuel oil meter—Rockwell.
Lube oil—Socony-Vacuum.
Lube oil cooler—Kewanee-Ross.
Lube oil purifier—Honan-Crane.
Lube oil filter—Hilliard.
Cylinder lubricators—Manzel.
Natural gas—North Central States Gas Co.
Gas meter—Rockwell.
Gas scrubber—Blaw Knox Co.
Cooling tower—Diesel Service Co.
Water softener—Refinite Corp.
Air filter—American Air Filter.
Exhaust silencer—Maxim.
Pyrometer—Alnor.
Exhaust flexible connections—Flexonics.
Switchboard—S & S Electric.
Alarm panel gauges—Lonergan.
Compressor—Worthington.
Consulting engineers—Fulton & Cramer, of Lincoln, Nebraska.

New 3440 hp. Nordberg Duafuel engine showing Manzel cylinder lubricators, gas valves, and pilot oil injection pumps.

SHALLOW DRAFT DIESEL TUG

For Operation in Thailand. This Shallow Draft Diesel Tug Features An Unusual Design. Permits Maximum Thrust. And Has Only 12-inch Draft

By ORMOND O. BLACK

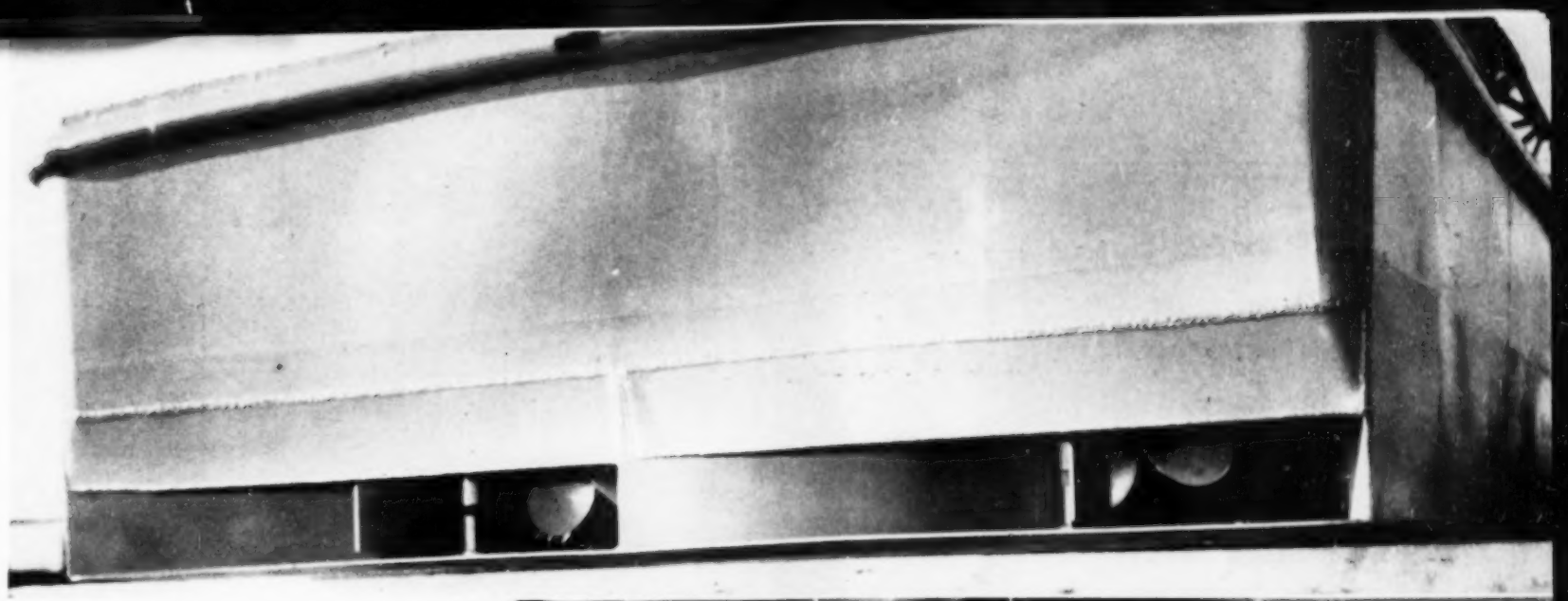


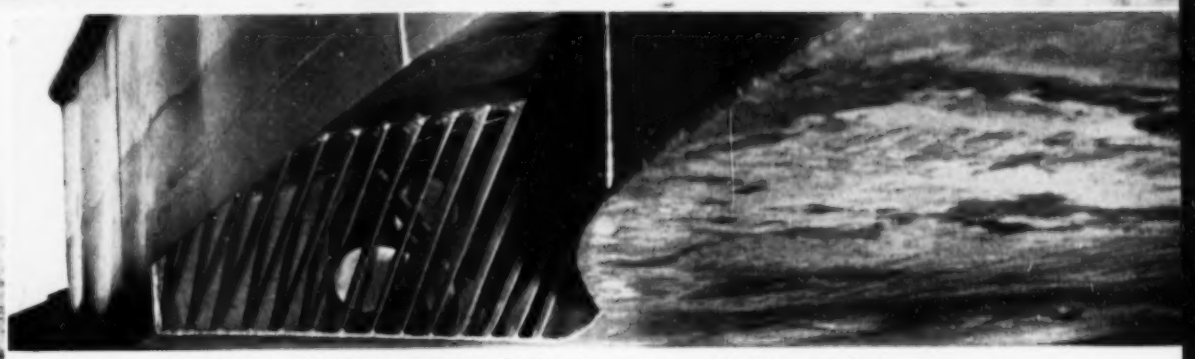
The shallow water, Murray & Tregurtha designed, diesel tug. Note the handy arrangement for one man operation. Two 40 hp. Hercules Model DHX-4D diesels placed amidships provide the propulsion power.

WHEN the request for a shallow draft tug was received from the United States South Asia Corporation it presented a challenge. They wanted not more than a 12-inch draft on a tug to meet operating conditions in very shallow rivers and canals. The job was given to Gordon Munro, naval architect and designer for Murray & Tregurtha of Quincy, Mass. He designed a side entrance tunnel tug. Proof of his success is presented on these pages.

Two shallow draft twin screw steel tugs were built and shipped for use by the Thailand Wealth Corporation and are in use there now. To meet the demand for shallow river transportation in waters that had been considered too shallow for practical towing operations Gordon Munro designed welded steel tug No. 225-I with twelve inches draft. The No. 225-I shown in pictures can be operated with ease by one man. It is shipped complete and can be put into operation very quickly after arrival at destination. In shallow waters the bottom of the boat is so close to the river bed that it precludes efficient operation with the propellers working in a conventional bottom entrance tunnel. In order to obtain maximum thrust efficiency, this boat has two engines driving twin screws that operate in special side entrance tunnels assuring the maximum flow of water to the propellers. A bottom plate closes the bottom of the tunnels protecting propellers and rudders from damage by grounding or striking submerged articles.

Easy one man operation is accomplished by placing two Hercules, 40 hp., model DHX-4D diesel engines amidships; steering and engine controls between the engines and the towing bitts well forward of the stern. Approximate performance: maximum speed running free, 8.5 smph. which is 13.7 km./hr. speed; towing barge of ten tons, 5.6 smph. which is 9.0 km./hr. speed; towing barge of 25 tons displacement, 4.9 smph. which is 7.9 km./hr. Length





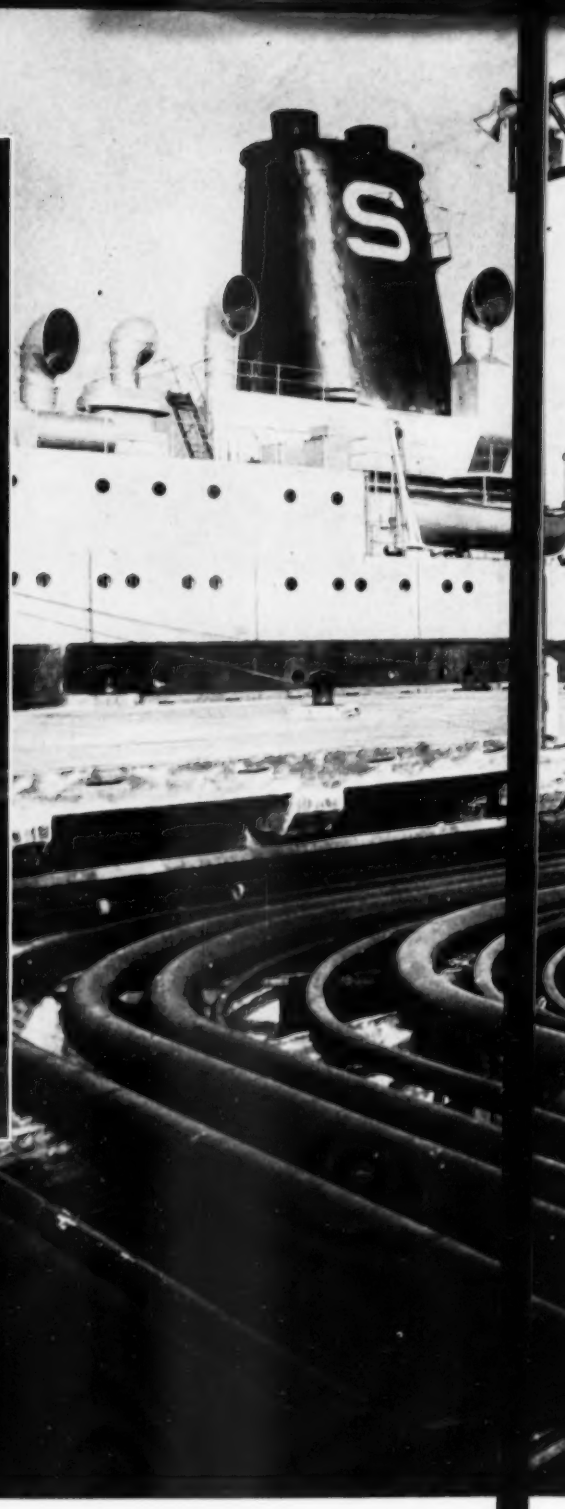
Top: **Stern view looking into the tunnels. Note the plate across the bottom of the tunnels to protect rudders and propellers against damage by grounding. *Bottom:* Starboard side, looking aft, showing the tunnel entrance, debris screen and propeller. This makes possible operation in shallow water with maximum thrust.**

of the 225-I is 35 ft., beam 9 ft. 9 in., depth 2 ft. 6 in., draft 12 in. and the total displacement is 12,000 pounds.

Other designs now being developed range from 35 ft. to 40 ft. in length, draw from 15 in. to 24 in. of water and have 170 hp. to 400 hp. It is predicted that the side entrance tunnel series of tugs for shallow water operation will have quick application to towing problems under shallow draft requirements. Murray & Tregurtha is able to draw on its experience as manufacturers of the Harbormaster and designers of Duoform Hulls used on oil tankers, harbor tugs, river towboats, fish boats and power yachts where there is danger of running the vessel aground.

The Hercules powered tug is shown towing the Murray & Tregurtha test barge. This barge has a displacement of 80 tons. Additional drag was provided by the propellers of the three Harbormaster units. Each of these propellers is 60 inches in diameter and has a full draft of 8½ feet.

A Cummins-powered logging truck with Twin Disc torque converter, owned by Hammond Lumber Co. In the past 2½ years, this organization has shown that hydraulic torque converters pay off in added life to tires, engines, brakes and transmissions. *Photo courtesy Watson & Meehan.*



One of Standard Oil of California's coastal bulk oil boats loading at the Long Wharf near Richmond refinery. The two sister ships, *Chevron* and *California Standard* have a 31,880 bbl. capacity. One is powered by 6-cyl. Nordberg and the other by an 8-cyl. Enterprise.

DIESEL TRUCKS BY THE THOUSANDS

By F. HAL HIGGINS

LOGGING dominates the industry and life of Del Norte and Humboldt counties in the northwest corner of California. Three out of four, perhaps more, jobs depend directly or indirectly on logging and its processing and marketing industries when the various services of machines, professional and governmental services are totalled. The farming and mining sectors of the populations are very minor and unimportant compared with other California counties, especially in the great valleys and on the rest of the Pacific coast. Fishing has a considerable rating to easily rank next to logging though very much less important in both income and population.

We know that Standard Oil of California as well as two of its competitors has its own plant to unload, store and distribute its petroleum products through this important logging area. This section of the country has been lifted to high logging production by the stimulus of war with a record increase of population. Standard Oil of California receives and distributes petroleum products all over Del Norte, Humboldt and Trinity counties and up across the Oregon line and as far as Medford. Furnace oils for heating homes, business and public buildings is a considerable item in spite of this being a surplus wood area.

Here is some idea of the extent of dieselization in this two-county area. The GM diesels are in a great number of boats in this harbor. Caterpillar powers another large segment of the harbor and fishing craft. In the saw-mills, a considerable number of change-overs to diesel has taken place since the end of the war with surplus twin GM's having gone to a large group because of the attractive prices. About 150 mills are powered by engines of various makes, Cummins, Caterpillar, International, Union, Waukesha, Cooper-Bessemer, Hercules, and Buda. There are both straight diesels and diesel-electrics. Mack, Buda, Hercules and Waukesha engines power the big logging and lumber haulers. The K-W and Peterbilt trucks have a big lead, but Mack is strong because of the aggressive leadership in the area.

Hammond Lumber Co., one of the biggest of the old established firms in this industry, has led with some research on the place of torque converters on dieselized trucks in logging operations. So reports the Hammond top management at its main office on Humboldt Bay when the writer called on them following his interviews with oil industry men on the harbor. "Go out to Big Lagoon, 20 or 21 miles up the coast highway toward Crescent City and talk to Gray Evans, logging superintendent,

A view of the dieselized fishing fleet in Eureka harbor. This is the second industry of the Northwest area and, like the logging industry, runs on petroleum products. Every diesel engine is represented, GM, Union, Fairbanks-Morse, Cummins, Caterpillar, Sterling and Hercules.

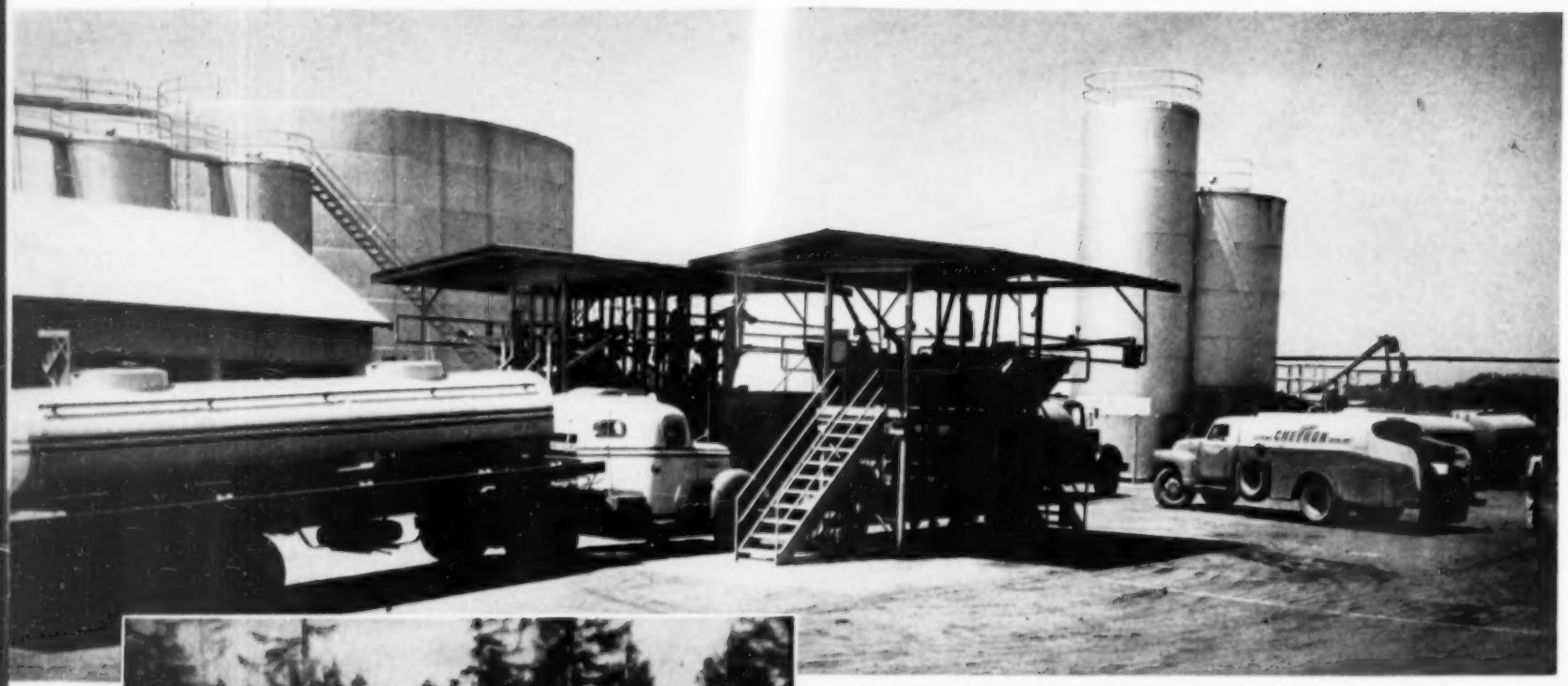
for Hammond there," advised Hammond's office manager. "Hammond has been studying the Twin-Disc torque converter on Cummins diesel engines in a fleet of four trucks we are operating here at Big Lagoon," replied Mr. Evans when interviewed. "One of these installations dates back 2½ years. We have had very good results with this installation. We find it is a big help in these times of having to use green drivers, or older drivers who are not the top in that field. The shock of shifting with big loads of logs is not so heavy. That can cause trouble if the load shifts, you know. This gives longer life to engine, tires, brakes, etc., and lengthens the time and number of loads between overhauls of truck."

Rains kept the writer from getting any pictures of this job on this particular day. However, a follow-up trip a week later by Mark Ogden of Watson & Meehan did catch these Hammond trucks, including the pilot Mack that had done the guinea pig work of proving the Twin-Disc torque converter on a Cummins diesel. This resulted in less wear and tear in handling big loads of logs moving over off-highway logging roads. And loggers generally know that Hammond knows logging in all its developments from bull and steam days to diesels.

The Hammond operations at Big Lagoon reflect the fast rise of the dieselized Mack trucks in the logging areas of the Pacific coast, say observers. Mack has a distributor with a farm a few miles out of Arcata where he has elbow room to show and demonstrate the Macks for logging prospects. Hammond has 19 model LMSWM Macks all powered by the Cummins 200 hp. NHB-600.

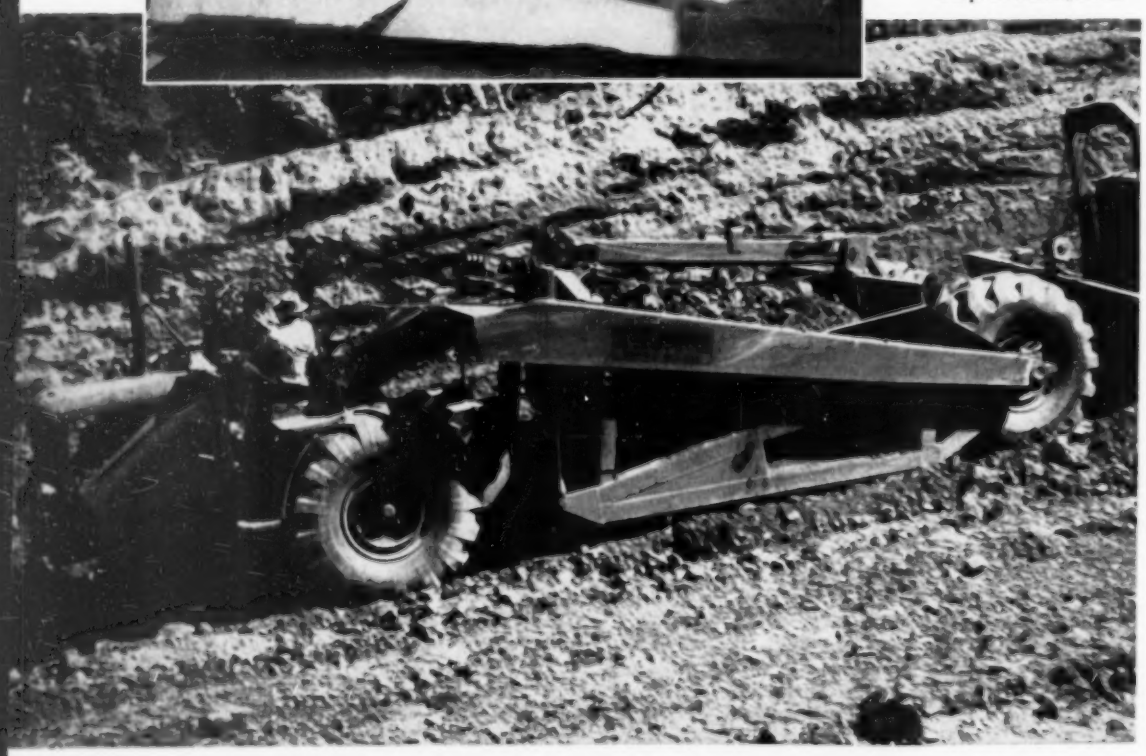
The visitor's questions about torque converters brought out the information that the Hammond Lumber Co., at its Big Lagoon operations some 20 miles up the coast above Eureka, had been testing Twin-Disc torque converters with its Cummins diesel engines in logging trucks, for about 2½ years. A call at the Hammond headquarters at Arcata sent the visitor to Log Superintendent Gray Evans and his assistant, Ed Griffith, at their Big Lagoon operations at Camp No. 1.

"We have four Cummins-powered logging trucks equipped with Twin-Disc torque converters," replied Mr. Evans when questioned about what the Hammond tests at rugged logging had proved about their place in truck logging. "We have had very good results," summed up Evans. "One of the main reasons for Hammond's equipping with these torque converters for our operations was the human element, or drivers, who are not always experienced enough to safely handle such loads on grades. Shifting gears give quite a load shock. The torque has eliminated that shock to increase life



The busy Standard Oil of Calif. Eureka plant showing the tank truck loading side.

A 6 hp. Lister-Blackstone diesel driving a slab thrower in a sawmill operated by S & R Tie Co., Fourmile, Ore.



A Utah Construction Co.'s Wooldridge powered by a Cummins, and pushed by an Allis-Chalmers GM-powered tractor, building a road for the Masonite Corp. of Ukiah, Calif.

of engine—longer time between overhauls—tires, clutches, brakes, etc. I have no final figures to state this in exact time between recaps, overhauls, or the decrease in parts and service time out. But I am sure these items will all show up when our tests are finally done. The torque converter is proving an essential to truck logging."

The visitor was again deeply impressed with the kind of thorough job the oil industry has done in its research work on the mechanized industry that has been dieselized in the past 20 years, or since the great crisis of the high speed diesels in the early 1930's when sticky rings, scratched and scored cylinder liners, and bearing failures had the tractor and truck engine builders tearing their hair out in bunches as they tried to keep their diesels sold after they were delivered and put on the jobs. The tractor builders frantically called on the oil industry to help solve their lube and fuel problems. The industry rallied around with the big prize of the high speed diesel lube and fuel business dangling in front of their eyes and the great battle for the answers started. Out of that came all the compounded oils with a lot of words like "additives" coming into the language of heavy equipment users from their oil contacts. But today, the logging and lumbering industries are as free of oil researchers as is the big dieselized open pit mines of Arizona.

Similarly, you see the trucks deliver the drums and tankers of oils, greases and fuels as casually as the milk man drops off 2 or 3 bottles of white liquid for the baby in the city deliveries. The oil industry is efficient, it has caught up with the machines and diesel engines and keeps its researchers inside the laboratories at Martinez, Richmond, Los Angeles and such refinery research spots. But at each key distribution point like Eureka, Standard of California does keep a fuel and lubricant engineer. If the problem becomes too technical, a special lubricating engineer goes out to the job. But if the problem looks bigger, a part and some oil drainings may be sent to the laboratory in Richmond.

HERINGTON, KANSAS

Two Fairbanks-Morse Dual-Fuel Engines Cut Fuel and Lube Costs From 7.8 to 3.47 Mils Per Kwh. at the Herington, Kansas, Municipal Power Plant

By ENOS PURCELL*

BY switching from diesel to predominantly dual-fuel operation, the forward-looking municipal power plant at Herington, Kansas, is currently supplying its local citizenry with a new high of more than 6,000,000 kwh. of electricity a year—at an average fuel and lube cost of only 3.47 mils per kwh., less than half the former cost. This achievement in cost saving is returning handsome dividends to the community in the form of lower utility rates, cheaper public service and reduced taxation, and is due chiefly to the performance of a new Fairbanks-Morse opposed-piston dual-fuel engine which was installed in 1951 as part of a modernization and expansion program. A second dual-fuel engine is a Fairbanks-Morse Model 33F16, which was converted from full-diesel operation to dual fuel in the same year. Three smaller F-M Model 33s complete the list of prime movers installed in the plant.

In 1952 the opposed-piston engine carried 83.9 percent of the total load, the converted unit 11.6 percent, and the remaining three oil engines 4.5 percent. Together they generated 6,063,400 kwh. of electricity and consumed 81,922 gallons of fuel oil, 61,355 mcf. of natural gas and 3,505 gallons of lube oil. At a delivered price of $0.085 per gallon of oil, $0.202 per mcf. of gas and $0.49 per gallon of lube, this represents an average fuel and lube cost of 3.47 mils per kwh., the lowest in the history of the plant. This compares with a fuel and lube cost of 7.8 mils per kwh. in 1950, the last year of full-diesel operation. At that time the plant generated 4,799,800 kwh., using 110,214 gallons of oil and 5,240 gallons of lube.

Perhaps the full significance of how much the economy-minded city of Herington has saved in dollars and cents might be better understood by comparing actual yearly fuel bills. In 1952 the plant generated 1,263,600 more kwh. than in 1950, due to its expanded facilities. However, at the end of this record year the total fuel and lube bill amounted to $16,367.52 less than it did in 1950, a drop of 43.7 percent, despite the increased output.

In 1951 the plant transferred a total of $27,830 to the city, and in 1952 it followed this with approxi-

*Superintendent, Municipal Water and Electric Dept., Herington, Kansas.

mately $50,000. As a result, at the end of only three years the city will find it possible to call in a 10-year bond issue of $80,000 which it used to help finance the modernization and expansion program of the plant.

The Fairbanks-Morse opposed-piston engine which is making most of these savings possible is a 10-cylinder Model 38D8⅛ unit, rated at 1,600 hp. at 720 rpm. It drives directly an F-M alternator with direct-connected exciter. In its first full calendar year of dual-fuel operation (1952) the opposed-piston engine ran almost continuously, being in service more than 86 percent of the time, and generated 5,089,900 kwh. of electricity. At the same delivered price mentioned above, the O-P's consumption of 53,661 mcf. of natural gas and 56,687 gallons of fuel oil represents an average fuel cost of only 3.35 mils per kwh.

On a recent test it handled an overload of 15 percent without any difficulty. This engine automatically switches over to full oil operation should the normal gas pressure fail, while if the normal pressure in the pilot oil system should fail, the unit shuts down automatically to prevent gas from collecting in the system. The same safety devices are built into the plant's second dual-fuel engine, the converted Model 33F16, which develops its rated 1,200-hp. at 300 rpm. and operates at an average fuel cost of 3.38 mils per kwh. Together these two units handled 95.5 percent of the plant's total production in 1952—when load peaked at 1,325 kw.

The remaining three oil engines are also by Fairbanks-Morse. Two of them, Model 33s which develop their rated horsepower at 257 rpm., have been giving excellent service since 1927 and 1928, when they replaced two of the plant's outmoded semi-diesels. In 1935 they were converted to the open-head type as part of another modernization program and their horsepower raised from 560 to 600 hp. That same year saw the purchase of the plant's third diesel engine, a Model 33D16 which develops its rated 600 hp. at 257 rpm. This unit replaced the last of the semi-diesels then in use.

Natural gas with a heating value of 900 btu. per cubic foot is purchased at an average cost of $0.202 per mcf. Delivered prices are $0.25 for the first 200 mcf., $0.22 for the next 100 mcf. and $0.20 for any amount over 300 mcf. The gas reaches the plant at 80 psi. and is reduced to 42 psi., passing through a regulator and orifice meter. Before going to the engines it is further reduced to 30 psi. Fuel oil, of 30-32 gravity, is purchased at the rate of $0.085 per gallon and is delivered in tank car lots by the Rock Island and Missouri Pacific Railroads, whose main lines run close to the plant. It is stored above ground in two steel storage tanks with individual capacities of 35,000 gallons.

A transfer pump sends the fuel oil through the full-flow filter and through a meter to the day tanks located at the base of each engine in the basement of the plant. An engine supply pump then picks it up and sends it to the injection pumps through duplex filters. The fuel oil has a Saybolt Universal viscosity rating of 35 sec. at 100 degrees and is so clean that the plant has found it unnecessary to change filter elements for a full year.

Each unit is equipped with an oil cooler, a filter and a motor-driven auxiliary lube pump. A built-in pump in the filter draws oil from the sump, filters it and returns it to the sump. Periodic tests have shown no signs of fuel dilution, the oil being in excellent condition at all times and never being in need of a change. Treated city water is used in the plant's closed cooling water system. Three motor-driven centrifugal pumps circulate the water through copper coils in an induced-draft cooling tower and through the jackets on all five engines.

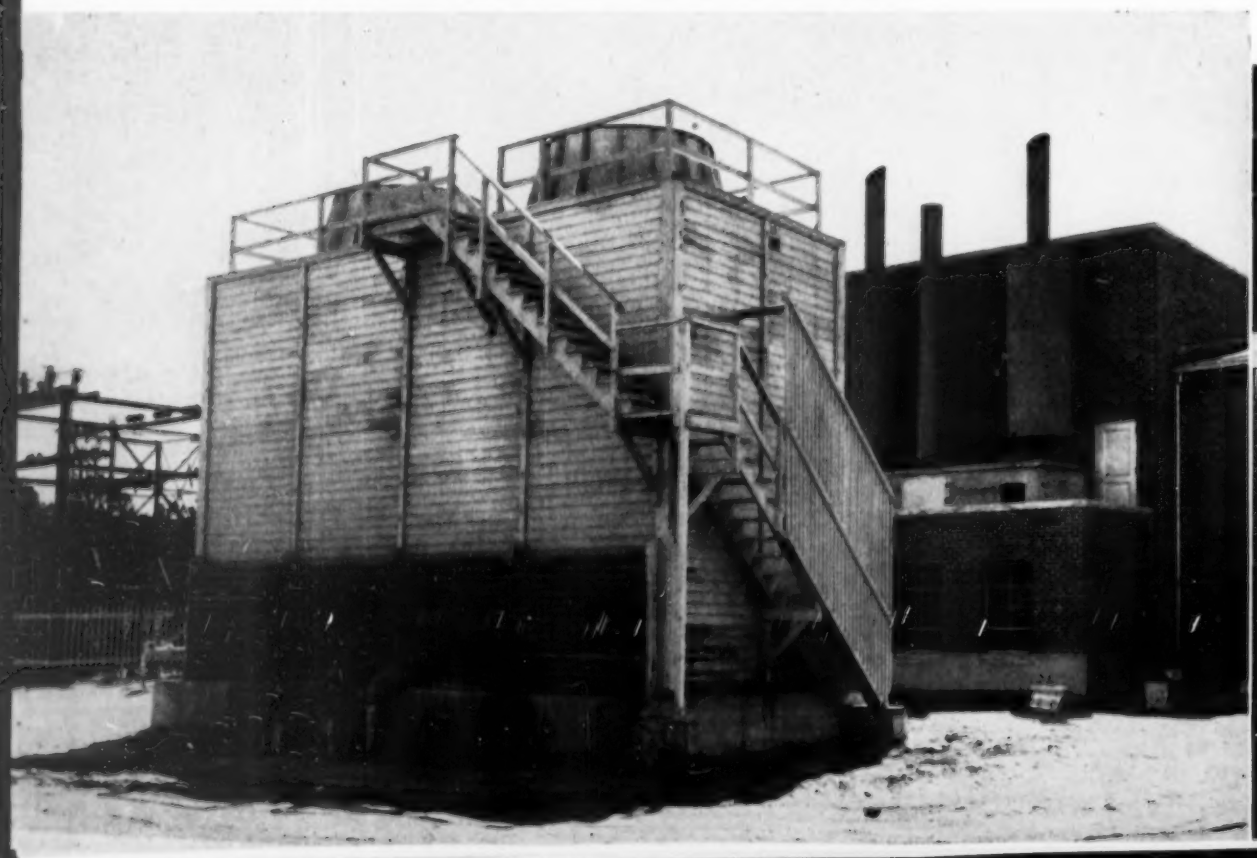
These pumps are run at all times, and in addition jacket water for the opposed-piston engine, which carries 83.9 percent of the plant's total load, is circulated by its own built-in pump. A thermostatically-operated by-pass valve on this engine keeps the inlet water at an even 140 degrees.

Warm engine water is further utilized by circulating it through idle units for quick-starting purposes and by sending it through the plant's hot water heating system. Raw water for the overhead spray in the cooling tower and for the oil coolers on each engine is supplied by three additional motor-driven centrifugal pumps. Intake air is supplied to the engines through concrete air chambers, 8 feet by 8 feet by 7 feet high, equipped with viscous impingement-type filters which serve as silencers as well. Engine exhaust gases are expelled through vertical exhaust silencers which are located outside the plant.

An efficiently arranged panel is mounted on each engine with a full set of pressure and temperature gauges as well as a multi-point exhaust pyrometer. Alarms are provided on lube and fuel oil pressures and on jacket water pressure and temperature. Herington is a growing city of 4,500 population, located in central Kansas, 35 miles from the geographical center of the United States. It has been well known for many years as the junction point of the Rock Island Railroad. The city's first attempt to found a municipal power plant met with failure in 1888 after a year of operation. The plant was sold to a private utility in that same year and then repurchased in 1908, after the private utility itself had failed to make a go of it. The Herington plant has been thriving ever since, despite some mighty tough sledding in the early days of reciprocating steam engines and belt-driven generators. No one could predict when the big belts would break and all the lights in town go out for the remainder of the night.

The first oil engines, consisting of three four-cylinder Fairbanks-Morse semi-diesels, were purchased to replace the original steam engines in 1923 and 1924. The city's population continued to grow by leaps and bounds, however, and the next ten years

The Marley induced-draft cooling tower is located at the rear of the plant.

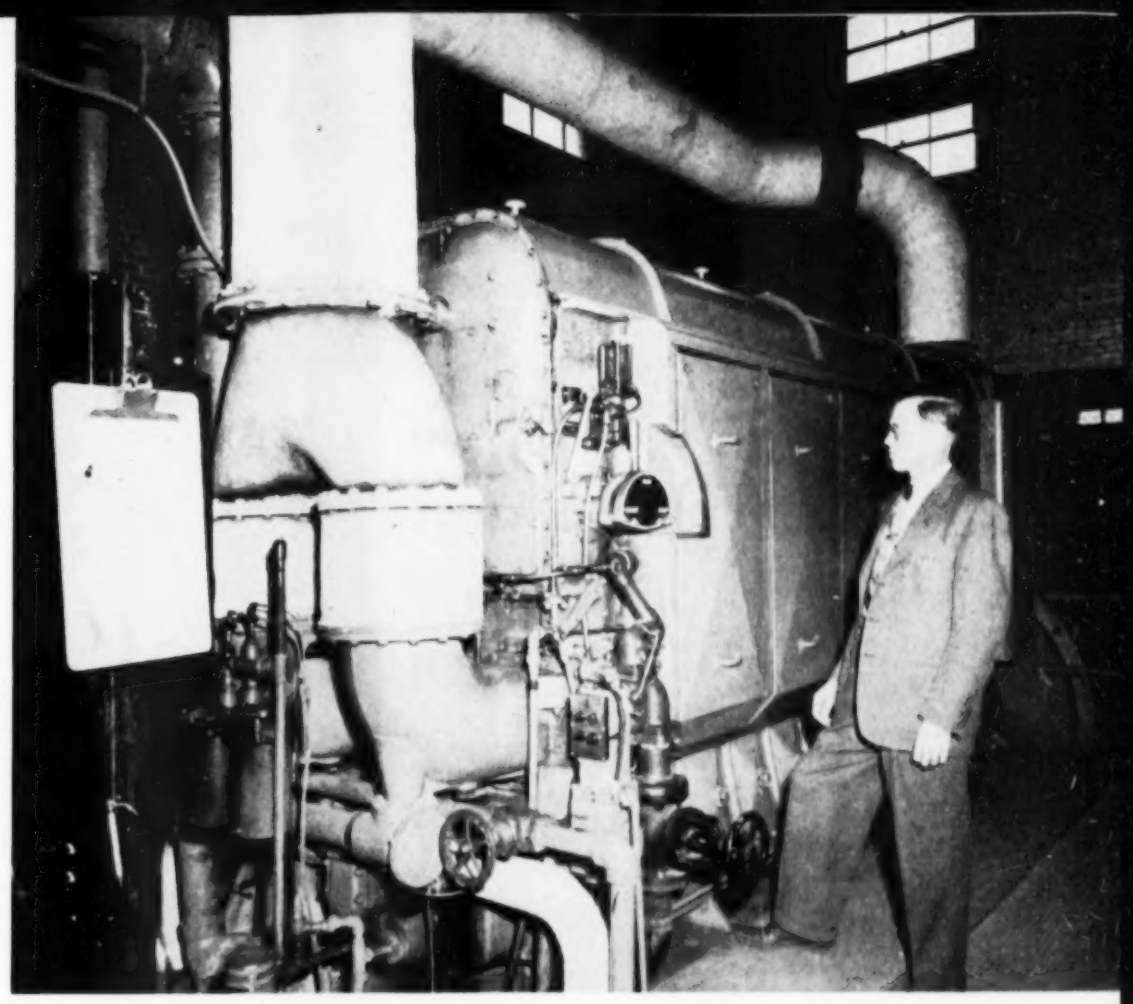


Natural gas enters the plant at 80 psi. and passes through this Emco meter and regulator before reaching the engines at 30 psi.

saw the passing of the semi-diesels and the introduction of Fairbanks-Morse diesel engines. Two F-M Model 33s were installed in 1927 and 1928 and a Model 33D16 in 1935. All three are still in operation. But the need for additional electric power continued to grow and became even more acute during World War II, when the Herington Army Air Base was constructed. Since it was impossible for the city to obtain additional generating equipment due to war shortages, the three Model 33s were operated around the clock at near capacity loads to meet the increased demand.

As soon as the war was over, however, steps were taken to remedy the situation. A new power plant building was erected and all equipment, excepting the three Fairbanks-Morse engines and generators, was replaced. The 1,200-hp. Model 33F16 unit was purchased in 1947 and, when the Beech Aircraft Company of Wichita leased the air base facilities from the Army in 1951, the 1,600-hp. O-P was added to the list of prime movers. In addition, conversion parts were procured for the 1,200-hp. engine, enabling the city to take advantage of the cheap natural gas then available. These improvements brought the total horsepower of the plant up to its present 4,600.

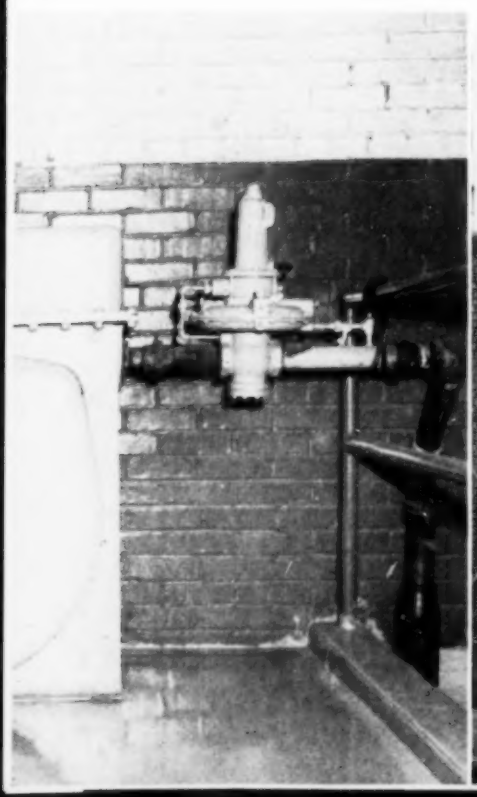
A breakdown of the plant's 1952 sales gives a clear idea of how its power is distributed: industry, 1,859,000 kwh.; residential, 1,329,400 kwh.; commercial, 2,132,400 kwh.; station power, 209,500 kwh.; street lights, 303,860 kwh.; miscellaneous, 402,600 kwh. In addition to street lights, the plant supplies low-cost power to the city's sewage plant, public buildings, parks, recreation center and athletic fields. With its 55.5 percent savings in fuel costs, the plant is paying for the city's sewage system, the water plant and new street equipment—a great boon to local taxpayers. There has been very little change in faces at the Herington plant through the years, as the following list of operators and their years of service will testify: Elmer Woosley, 34 years; Tom Godfrey, 32 years; and John Fisher, 12 years. Mr. Woosley and Mr. Godfrey have been with the plant since its early steam engine days.

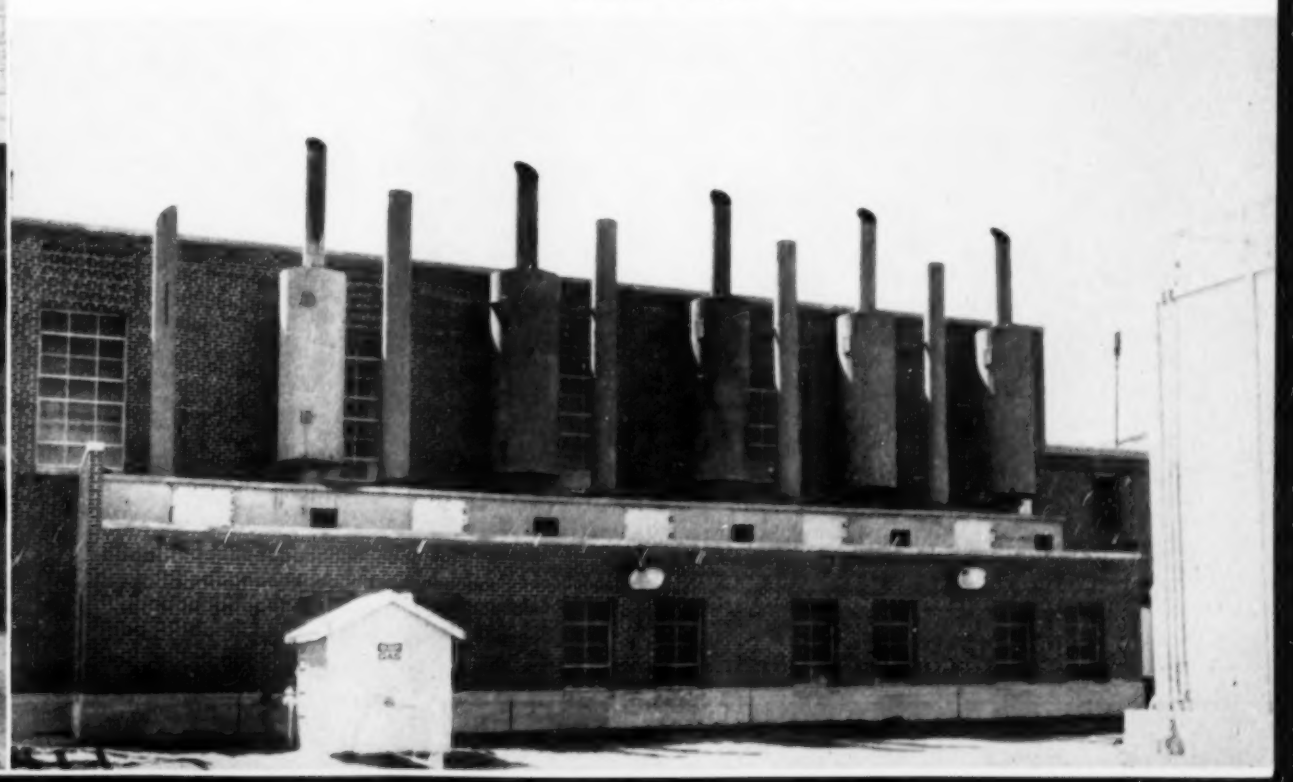


Enos Purcell, the author of this article inspects the opposed-piston engine. The O-P's Woodward governor is in the center foreground and the Nugent duplex fuel filters at the lower left.

List of Equipment

Engines—1600-hp., 10-cylinder, 720 rpm., opposed-piston, dual-fuel, Model 38D8⅛, Fairbanks, Morse & Co.
Generator—1136-kw., 1420-kva., 3-phase, 60 cycle, 2400-volt, Type TGZO alternator, F-M.
Governor—Woodward.
Fuel Oil—McPherson Refinery.
Fuel filter—Nugent.
Natural gas—Central West Utility Co.
Gas meter—Emco-Rockwell.
Fuel oil meter—Neptune.
Lubricating oil—Vacme 3, Socony Vacuum.
Lube filter—Midwest.
Auxiliary lube pump—Roper.
Cooling water pumps (motor-driven)—Ingersoll Rand.
Cooling tower—Marley.
Thermostatic valve—Powers Regulator.
Air filter—American Air Filter.
Exhaust silencer—Maxim.
Switchboard—Westinghouse.
Exhaust pyrometer—Alnor.





Exhaust gases are expelled safely and noiselessly through these Maxim vertical silencers at the rear of the plant.

The Union Barge Line's new 166-ft. towboat, the *Southern* which is powered by two Superior diesels with Elliott turbochargers.

DIESEL TOWBOAT "SOUTHERN"

By DOUGLAS SHEARING

NEWEST addition to the river fleet of Union Barge Line Corporation is the towboat, *Southern*, a 166-foot vessel built by Dravo Corporation, Pittsburgh. The new craft has joined Union's fleet of modern vessels operating in common carrier service on the Mississippi River system. Launched Sept. 3 at Dravo's Neville Island Shipyard, the *Southern* left Oct. 29 on her 1850-mile maiden voyage down the Ohio and Mississippi Rivers from Pittsburgh to New Orleans. The vessel is equipped with the latest type of machinery and facilities for river transportation service and is outfitted for maximum non-stop operating range, so that, under normal conditions, she can make the Pittsburgh-New Orleans round trip without stopping to refuel.

The *Southern's* hull and superstructure are of welded steel construction throughout, and lined with insulation where needed for the crew's comfort. The main deck house encloses refrigerating machinery and living quarters. An upper deck house provides space for the galley, mess rooms, laundry, officers' quarters, and supports the pilothouse above. General dimensions of the *Southern* are as follows:

Length, over-all (molded)	166 ft.
Beam (molded)	36 ft.
Depth at side (molded to main deck)	11 ft. 2 in.
Sheer forward	1 ft. 6 in.
Sheer aft	10 in.

Draft of the vessel varies according to tonnage of oil and stores carried, but, in general, the draft does not exceed eight feet, two inches aft and forward when fully outfitted and manned and carrying slightly less than three-quarters of full fuel capacity. The hull forward, of modified ship model form, is fitted with four towing knees built into and forming part of the bow. Outboard lower knees extend around the deck corners. Seven main transverse water and oiltight bulkheads carried to the main deck divide the hull into compartments, and a non-watertight bulkhead running down the center line divides it longitudinally. The vessel is transversely framed on 24-inch centers up to within 24 feet of the bow; from there the spacing is 20 inches. Side and bilge plating is 17.5 pounds and bottom plating 14 pounds minimum throughout, except below the 9 foot water line for a distance of 25 feet aft of the bow. Here, one-half inch minimum thickness plating is used. The hull aft is formed to house two propellers in specially designed Kort nozzles. The two steering and four backing rudders are operated by hydraulic, ram-type steering engines controlled from the pilothouse with full follow-up control. Thus, helm angle will be indicated by the position of the control handle in pilothouse. The steering gears, of

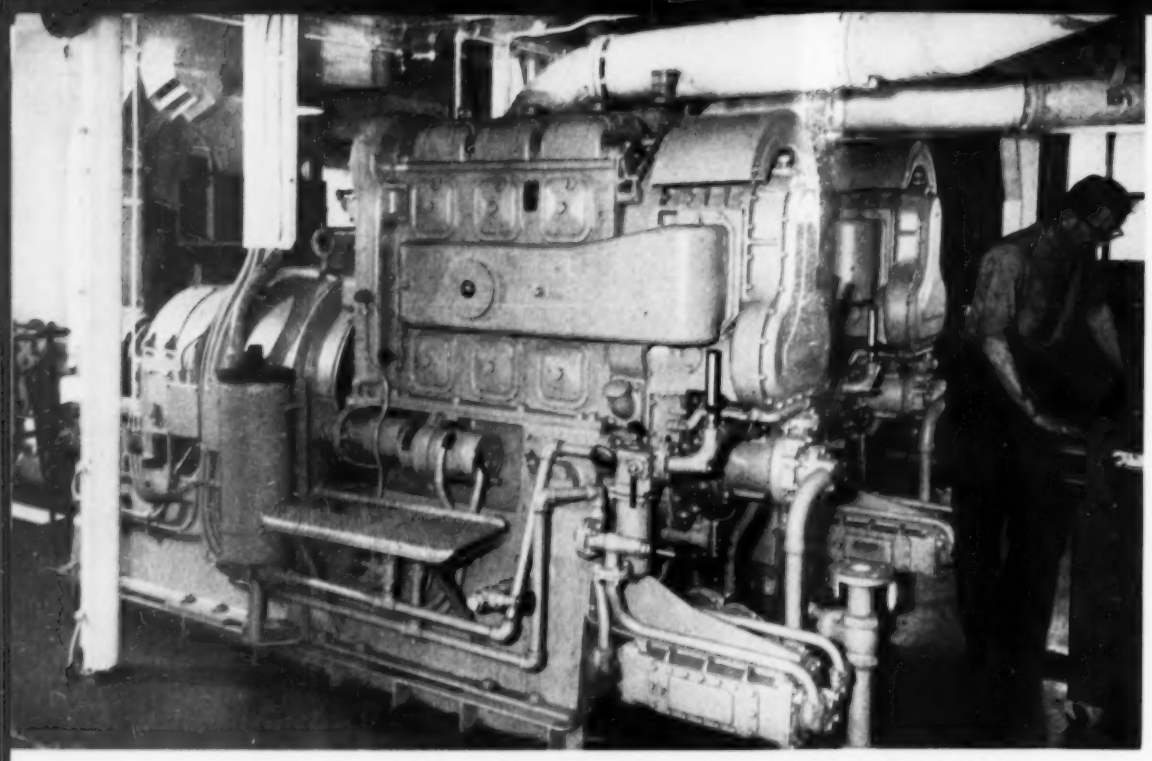
the double-ram type, operate on 410 to 485 lb. oil pressure supplied from a central system, and are capable of moving the rudders from hard over to hard over in 13 seconds.

Two double unit pumps furnish hydraulic operating pressure for the steering gears and deck capstans. Each unit consists of a double-ended 15-hp., 1200-rpm. motor driving two 28 gpm. variable volume pumps. Unit one is adjusted for continuous running at variable volume to maintain 485 lb. pressure in the storage tank. Unit number two operates on a pressure switch to start when tank pressure drops to 410 and stop when it rises to 450 lb. Both pumps serve a common pressure tank. The service pressure tank, capable of delivering 60 gallons at between 485 and 450 lbs., has an air cushion supply line connected to the 250 lb. compressed air system. The oil storage sump has a capacity of 225 gallons.

Propelling machinery and the numerous service heat exchangers are located in the hold amidship, with generating sets and air compressors aft of the main engine room. Steering engines are located in the after hold; gear stowage and rope drying in the forward hold. Forepeak contains the tank compartment for water, lube oil and fuel oil storage. Power for propulsion comes from two National Supply Superior, Model 65-SX-8, 8-cylinder, 12¾ x 15 inch, Elliott turbocharged diesels rated 1500-bhp. at 600 rpm. and 128 bmep. One engine operates a left-hand propeller, and the other a right-hand propeller, both rotating inboard at the top when going ahead. Westinghouse Air Brake speed and directional engine controls are provided in the engine room and pilothouse. Starting air is supplied by two 14-cfm., 250-lb., air cooled, motor driven air compressors equipped with receivers.

The main engines are equipped with reverse and reduction gears. With these gears, manufactured in England, the main engines run continuously in the same direction even while the towboat is moving in reverse. Thus, it is not necessary to stop the engines to reverse the vessel's direction. The oil operated reverse-reduction gears were designed and manufactured by Modern Wheel Drive Ltd. of England. The *Southern* is the first American vessel to be fitted with them. It is MWD's Type M2WR size 7. Each gear is capable of transmitting 2,000 shp. at an input shaft speed of 600 rpm. but for the *Southern* the following applied: continuous rating, 1,750 shp. at 600 rpm.; total reduction ratio, 2.73 (ahead) and 2.57 (astern). The approximate weight of each gear is eleven tons. The gear is of strong design and the gear primary shaft, which is coupled to the engine by means of an MWD tangential spring coupling which takes care of the torsional system, is provided with an ahead and astern pinion, the former meshing directly with the ahead gears on the two clutch shafts, while

Looking down on one of the National Supply Superior Model 65-SX-8, 8-cyl. Elliott turbocharged diesels which power the *Southern*. Each engine is rated 1500 bhp. at 600 rpm. Instrument panel and engine room panel in background. Main engines can be controlled from the pilot house or engine room by Westinghouse Air Brake control system. Note Nugent filters in right foreground.



These two General Motors diesel-driven generator sets with Delco generators and Delco-Remy starters furnish electrical power for the *Southern*. John DeMuth, assistant engineer, is at tool bench.

the latter meshes via an idler with the astern gear also on the clutch shaft.

Double helical gearings is used throughout the whole transmission. The flexibility inherent in the oil-operated clutches overcomes the disadvantages of an otherwise locked gear train. Plain bearings, pressure lubricated, locate the four shafts rigidly in the gear housing, and on the output shaft there is a Michell type thrust bearing capable of handling a propeller thrust of 30 tons, the housing of which is integral with the main gear casing.

The advantages claimed for the Modern Wheel Drive unit is the small length for power transmitted, compactness and simplicity of design, smoothness of operation and rapidity in maneuvering, low cost and long life, and a very great elasticity in application.

Electrical power for the *Southern* is furnished by two GM diesel-driven combination 100-kva., 220/440-volt, 3-phase, 60-cycle alternating current generators, and a 20-kw., 115-volt, direct current generator and 2.5-kw. exciter. Generator sets, mounted on ½-inch Fabrecka 31-ply vibration dampeners, are complete with heat exchangers, filters, strainers, batteries, battery charging panel, alarm signals and mufflers. Power is distributed throughout the boat through conductors having galvanized steel basket weave armor over rubber and Neoprene insulation for inside work. Conductors exposed to weather have a lead sheath between the insulation and the steel basket armor. Brass stuffing tubes carry the wiring through the ship's watertight bulkheads.

Engine fuel oil is clarified with one De Laval 350-gph. centrifuge complete with corrosion resisting bowl, sight glasses for oil and water outlets, panel mounted temperature and pressure gages, and integral suction and discharge pumps. One 12-gph. lubricating oil reclaimer also serves both engines.

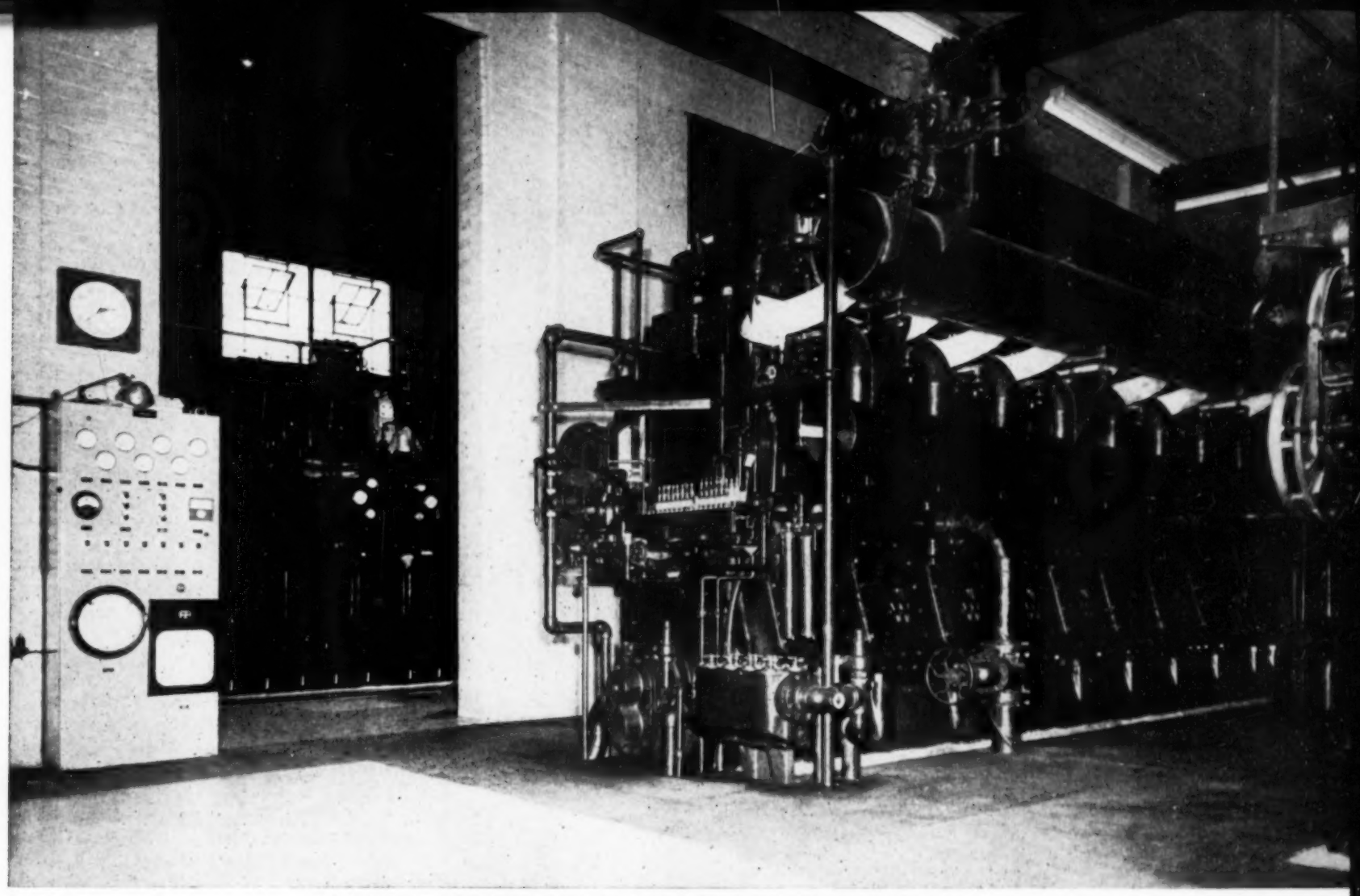
Two lube-oil scavenging pumps, and one fuel-oil transfer pump are provided. A hand operated rotary pump provides for emergency filling of the day tanks. Fuel oil is carried in six tanks, four of which are located forward of the engine room and two aft. One 3-in. Amot thermostat in cast iron on each engine is used for lubricating oil temperature control and 4-in. thermostats by the same manufacturer controls jacket water temperature. In addition, a 2-in. bronze Amot thermostat is used for lubricating oil control on the Modern Wheel Drive reduction gear.

List of Equipment

Main engines—Superior Model 65-SX-8. The National Supply Company.
Reverse and reduction gears—Modern Wheel Drive.
Turbochargers—Elliott
Circ. lube oil pump—DeLaval.
Lube oil filters—Hilliard.
Lube oil strainers—Purolator.
Shell and tube jacket water coolers—Kewanee Ross.
Raw water pumps—Weinman.
Intake air filters—Air Maze.
Lube oil reclaimers—Hilliard.
Fuel oil centrifugals—De Laval.
Generator units—General Motors Cleveland Diesel Division.
Fuel oil transfer pump—De Laval.
Lube oil scavenging pumps—De Laval.
Thermostats—Amot, American Motors Co.

Mr. Zehnder of Modern Wheel Drive (left), and Harvey Hanners, chief research engineer at National Supply Co., who worked out application of the Modern Wheel Drive's oil operated gears to the Superior engine. Spring coupling can be seen on engine flywheel.

View of the *Southern* pilot house with Captain Robert B. McCulloch at the controls. The vessel is equipped with all navigational aids for river service.



A view of the No. 3 Worthington engine showing the Manzel cylinder lubricator, pilot oil pump and Cuno fuel and lube filters. Alnor pyrometer is on instrument board at left.

LEBANON, OHIO

Worthington Engines in Lebanon, Ohio, Municipal Plant Save $11,700 in Year Despite High Fuel Prices

IN many parts of the country, there has been pressure by suppliers of natural gas for higher prices and power plant managers are calculating the possible effects of this trend on the economic utility of the dual-fuel engine. The town of Lebanon, Ohio, is demonstrating that, even with the largest foreseeable price rise, the average plant will still find dual-fuel engines a sound investment. Although paying the unusually high price of 55 cents per 1,000 cu. ft. for natural gas, Lebanon is earning substantial dividends from the operation of two new Worthington dual fuel engines. In 1952, with these units in service, average plant fuel cost per kilowatt-hour was 15 percent lower than in 1950, the last full year of straight diesel and steam operation. With production volume greater than 9,000,000 kwh., this meant a saving of $11,700 in fuel costs through use of gas-burning engines.

Lebanon, Ohio, is located some thirty miles northwest of Cincinnati and is primarily a residential community except for a large shoe factory which is operating, at this writing, on a ten hour day. This plant is the largest single consumer of electricity and provides good daytime load. The municipal power plant was constructed in the early 20's as a coal-burning steam plant and functioned with this type of equipment until 1941 when the city installed two 1,000 hp. straight diesel engines. Each of these 8 cylinder, 15½ x 22-in. engines drives a 700 kw. generator at 360 rpm. The diesels assumed the bulk of the load with the steam units relegated to peaking and standby service. When load expansion made it essential to install additional prime movers, Lebanon determined that dual-fuel engines would be the most economical power producers. The engines chosen were two 8 cylinder, supercharged Worthingtons of 16-in. bore and 20-in. stroke, rated at 1,760 hp. each at 360 rpm. Each drives a 1245 kw. generator.

The two older engines are in the newest part of the plant as they were installed when the steam units were still in service as spares. The two Worthington engines are in the original part of the plant which formerly housed the boilers and the steam engine generators. Operations were on tenterhooks during the installation of the latest engines for it meant operating without spare capacity from the time the steam boilers were shut down for the last time and the time that the new diesels were first placed on the line. Fortunately, no trouble was experienced. Put into service in April, 1951, the dual fuel engines vindicated the judgment of the city's engineers. In 1950, the last year of diesel-

Exhaust gases from the Worthington engines vent through Maxim silencers. Engine air is drawn through Air Maze filters.

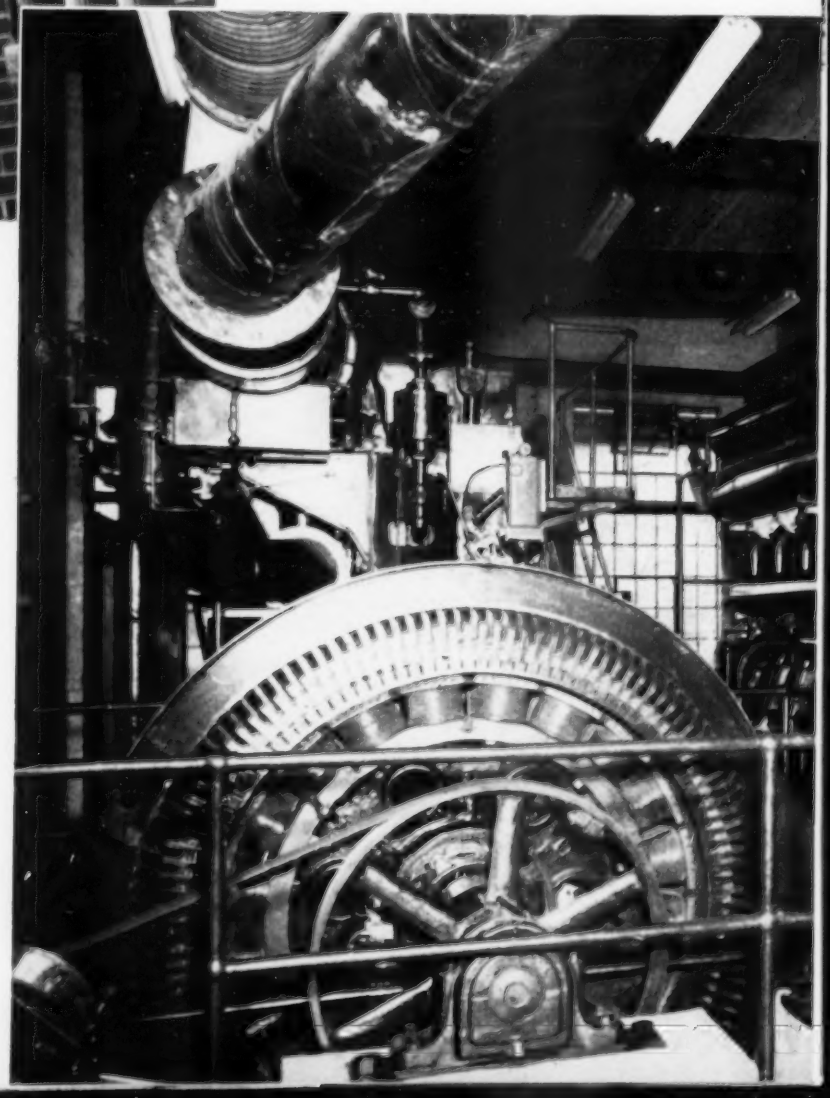
oil-burning engines to handle the daytime and early evening swings. As the load drops off after midnight, the oil-burning unit is shut down and the load is carried on the more economical dual fuel Worthingtons. This means using a larger engine for the small load with resultant poor load factor, but the Worthingtons are efficient at partial loads and the differential in fuel costs makes it profitable to use the dual-fuel engines. On alternate days, different combinations of engines are operated so that at the end of each month each unit has carried a load proportionate to its capacity and to its economy of operation.

Plant design and operation contribute much to the low operating costs and much emphasis is placed upon cleanliness. Realizing that meticulous operation is more easily achieved in an attractive, clean plant, city officials specified walls of tile and provided sufficient personnel to maintain the plant in spotless condition. Tile walls gleam over the smooth concrete floors and rubber matting helps to prevent footmarks in the more commonly used areas. Most of the auxiliaries are concentrated below the operating floor and the basement is kept as clean as are the operating areas.

Fuel gas is piped in at fifty pounds pressure and regulated to thirty-five pounds in the plant. Fuel oil is shipped in by rail and is stored in two insulated 10,000 gallon tanks located immediately south of the two cooling towers. One tower serves each pair of engines. Cool water from the towers is circulated through the shell side of the heat exchangers while treated water from the engine jackets is circulated on the tube side. The jacket water has

steam operation, the plant produced 7,691,915 kwh., of which the diesels generated all but 109,080 kwh. Total fuel cost was $63,987.89, an average of 8.32 mills per kwh. In 1952, the first full year of diesel-dual fuel operation, total plant output was 9,022,576 kwh., of which the dual fuel engines generated 7,322,096 kwh. Total plant fuel cost was $63,590.41, an average of 7.01 mills per kwh., a saving of 1.28 mills per kwh. or more than $11,700 for the year. The fuel cost for the dual fuel units alone, of course, is lower than the plant average cited. Currently, the engines are averaging consumption of 11 cu. ft. of gas and 0.0047 gal. of pilot oil per kwh. generated in spite of relatively unfavorable load factors. Peak loads run up to 2,000 kw., but after the shoe factory shuts down for the night, and commercial and residential use drops off from evening peaks, the power load goes down as low as 450 kw.

With these load conditions, standard procedure is to operate one of the Worthington units carrying the base load in company with one of the older

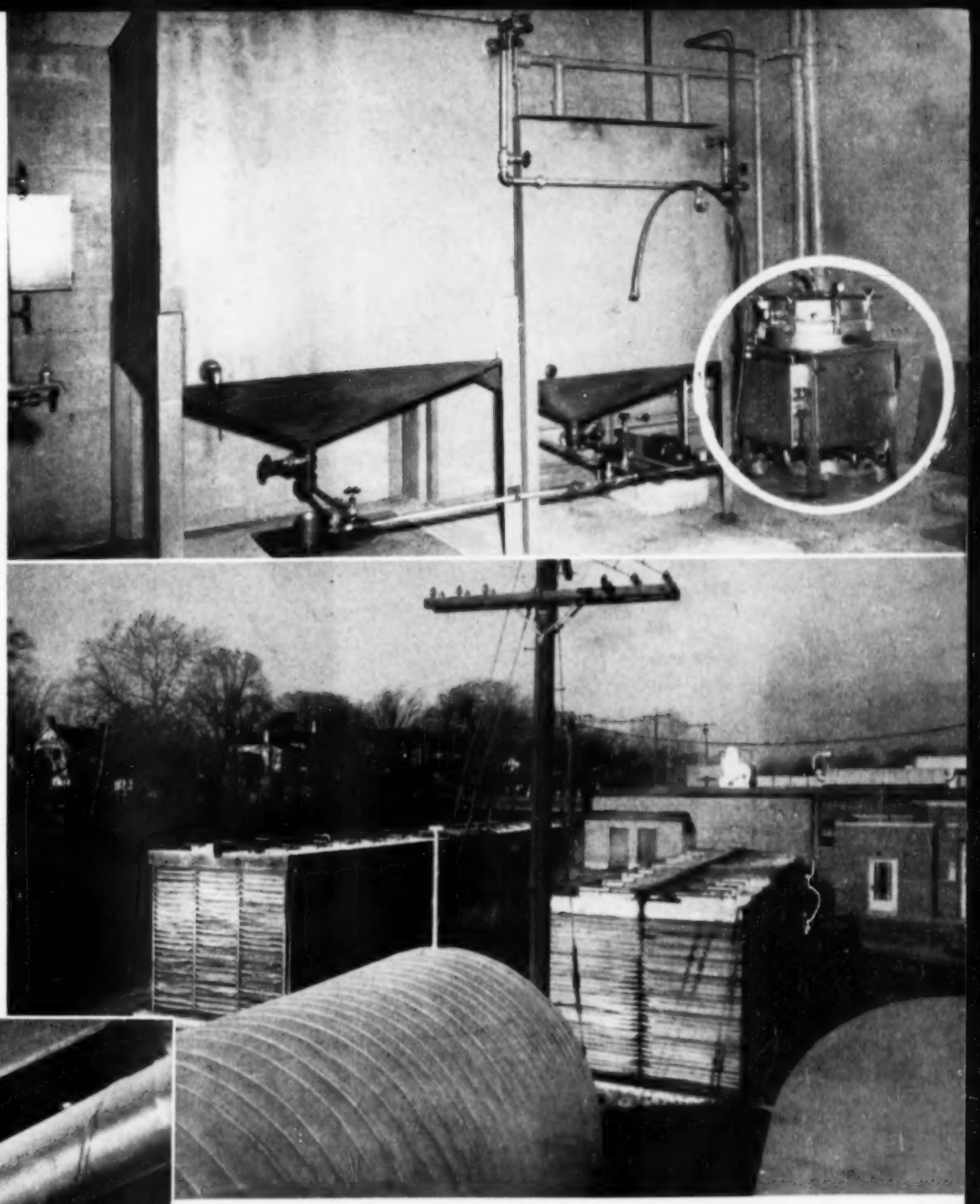


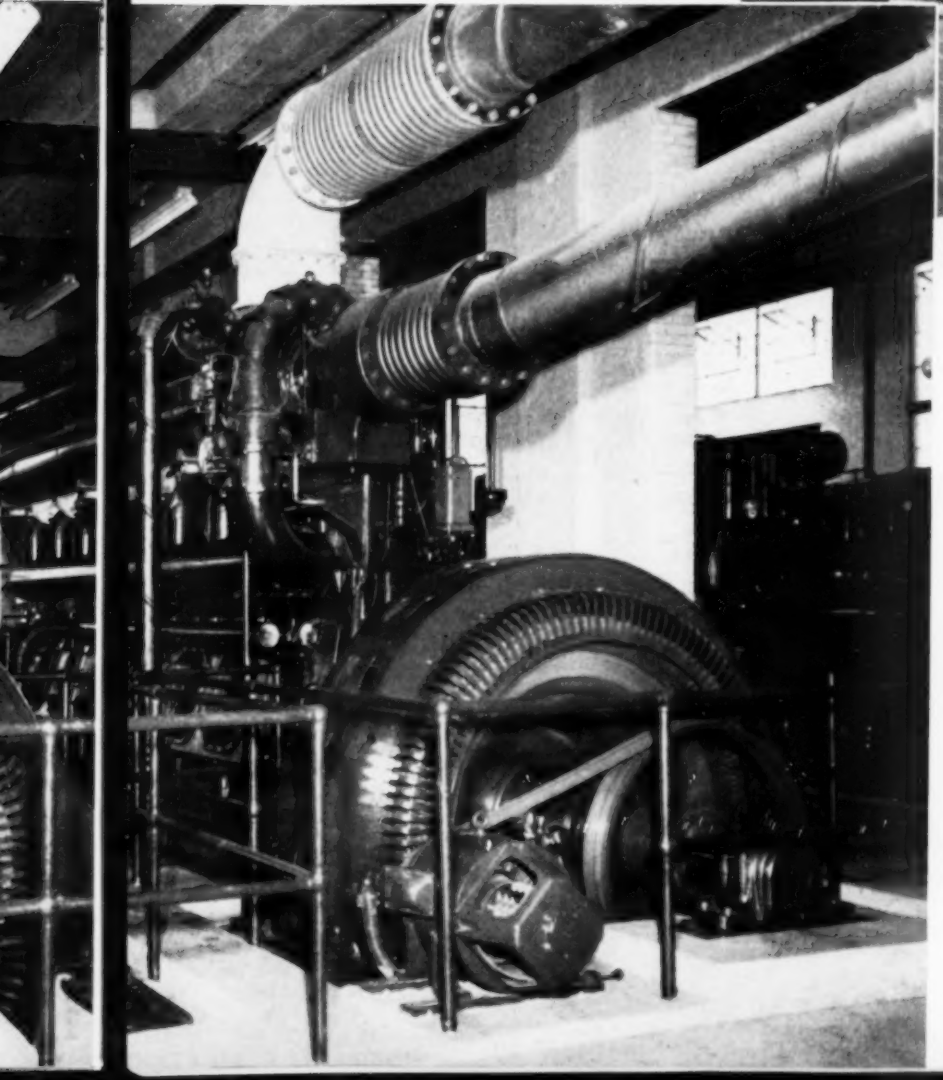
Operating on natural gas, these Elliott supercharged Worthington dual fuel engines are saving the town of Lebanon, Ohio, $11,700 a year. Each engine drives an Electric Machinery generator.

its own zeolite treating system for make-up water.

This is the same treating system that formerly supplied make-up water for the steam boilers. A separate circuit from the cooling towers handles the cooling of lube oil in shell and tube heat exchangers. These are located directly under the engines in the basement. Interesting is the use made of a lube oil reclaiming unit. This installation, complete with its own pumps, can empty the crankcase of an engine and refill it with clean oil in a matter of minutes. The dirty oil is pumped to a "dirty oil" tank, purified, and then pumped to the clean oil storage tank for reuse in the engines. Lube oil consumption has been low. For the full year 1952, the two Worthington engines averaged 9,213 rated horsepower-hours per gal. of lube consumed. Auxiliary lube oil pumps are fitted so that oil may be circulated prior to startup, thus eliminating a major cause of engine wear. All cooling water pumps, the fuel oil transfer pumps and the auxiliary lube oil pumps are located in the basement as are the jacket water and lube oil coolers. Also housed in the basement are the fuel day tanks, the air compressors and the four compressed air storage tanks. Air is used for engine starting and also for some of the instrumentation.

Lebanon has achieved both flexibility and economy through its choice of dual-fuel engines for the city is free to use whatever fuel is most favorably priced. In spite of the unusually high price of natural gas, that fuel has provided the most economical source of heat energy for the city's prime movers. This is a growing community and the development of better night loads will promote greater engine efficiency and further reductions in costs.





Top: **This Hilco lube oil reclaiming unit, circled, with the dirty and clean oil tanks shown to the left, reclaims crankcase oil for all engines in the plant.** ***Bottom:*** **Here are the two Marley natural draft cooling towers with the fuel oil storage tanks in the foreground. Municipal garage is in the background.**

Note Badger exhaust hose line connections and Naylor exhaust pipe on the Worthington dual-fuel engines.

List of Equipment

Engines—(2) 1760 hp., 8-cylinder, 360 rpm., Model SEH8, supercharged, dual-fuel engines. Worthington Corporation.
Alternators—(2) 1215 kw., 3-phase, 60-cycle, 2400 volts, alternators with V-belted exciters. Electric Machinery Mfg. Co.
Governors—Woodward.
Fuel oil pumps—Worthington.
Fuel filters—Cuno.
Lube oil filters—Cuno.
Lube oil reclaimer—Hilliard.
Lube oil coolers—Struthers-Wells; Kewanee-Ross.
Lubricating oil—Texaco.
Auxiliary lube oil pumps—Worthington.
Cooling water pumps—Worthington.
Heat exchangers—Struthers-Wells.
Cooling towers—Marley.
Switchgear—Allis-Chalmers.
Water treatment—Permutit.
Silencers—Maxim.
Air filters—Air Maze.
Exhaust pyrometers—Alnor.

This Euclid 4FFD is going down a 7 percent grade at an Arizona copper mine without using conventional friction-type brakes. Instead, the driver maintains positive control over the down-hill speed with the Allison Torqmatic brake. Oil from the Torqmatic drive does the braking.

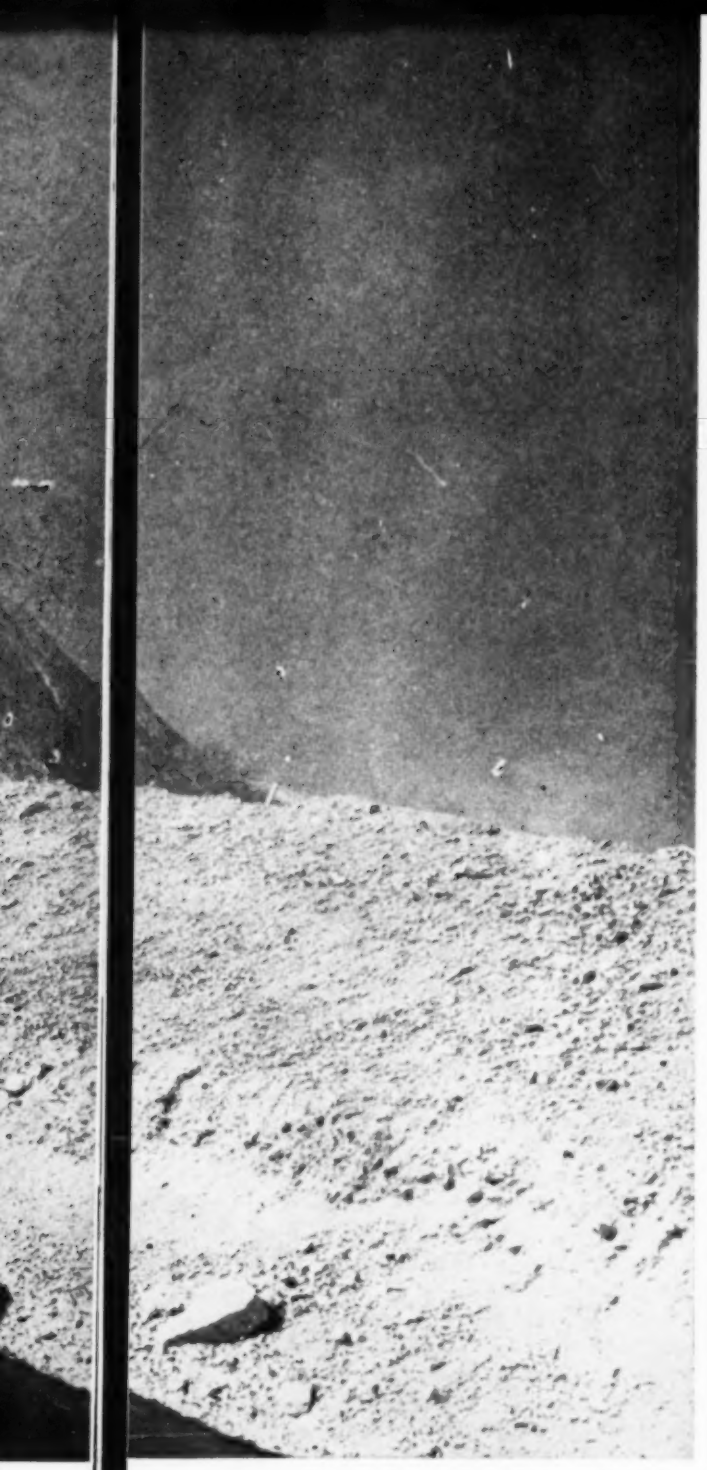
THE ALLISON TORQMATIC BRAKE

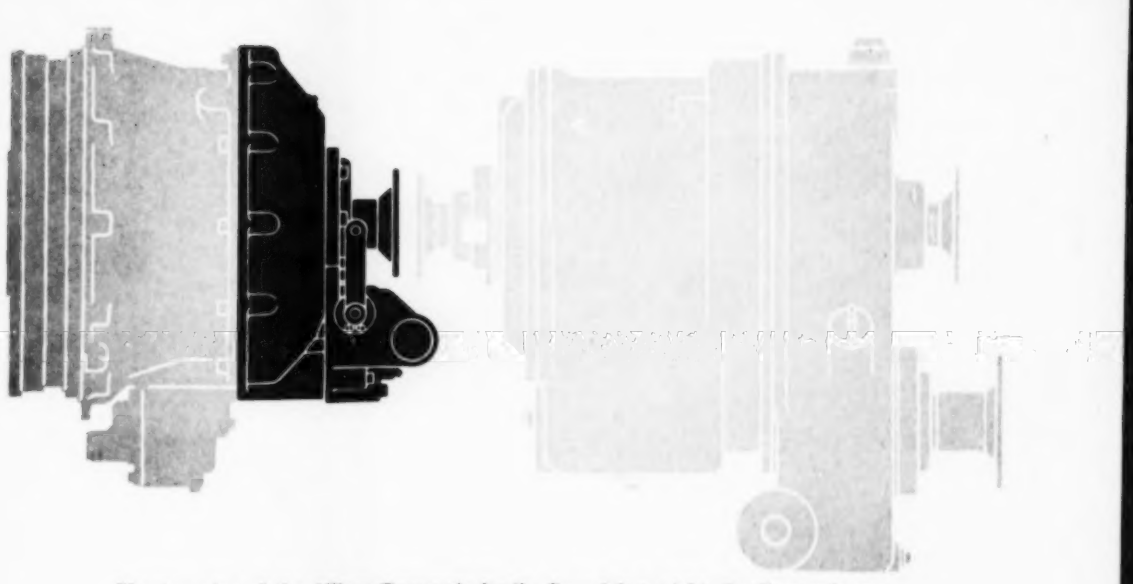
By BRUCE WADMAN

THE new, in-the-drive-line Allison Torqmatic brake gives off-highway vehicles constant braking power where most needed—on downhill hauls. The driver has positive control at all times with the Torqmatic brake continuously applied going down the steepest grades with the heaviest loads—it saves service brakes for complete stops or "snubbing" on curves. The dynamic brake is simple, it has only one moving part. The vehicle's own rolling force torqmatically produces the braking energy in any speed range, subject only to the limitations of the drive system.

There are only three major parts in the Torqmatic brake: the rotor, assembled as an integral part of the converter output shaft; the stator vanes, cast into the housing which encloses the rotor; and the control valve, which provides varying degrees of dynamic braking effort. There are no linings, drums or brake shoes to wear out or burn out. The compact construction saves space—adding only four inches to the converter's length. No separate oil system is required for the Torqmatic brake. It is connected with the Torqmatic drive oil system. No extra oil charging pumps are needed.

To brake a vehicle going downhill, the driver opens the control valve to let the oil into the rotor cavity. The truck's wheels turn the rotor, or "paddle wheel," through the transmission. The rotor throws the oil in the rotor cavity against the fixed stator vanes which resist the oil flow. This makes it harder for the rotor to turn and correspondingly makes it harder for the truck's wheels to turn thus slowing the vehicle. The oil does all the braking work and also absorbs the heat generated by the braking action. The pumping action of the rotor circulates the oil to the heat exchanger where the



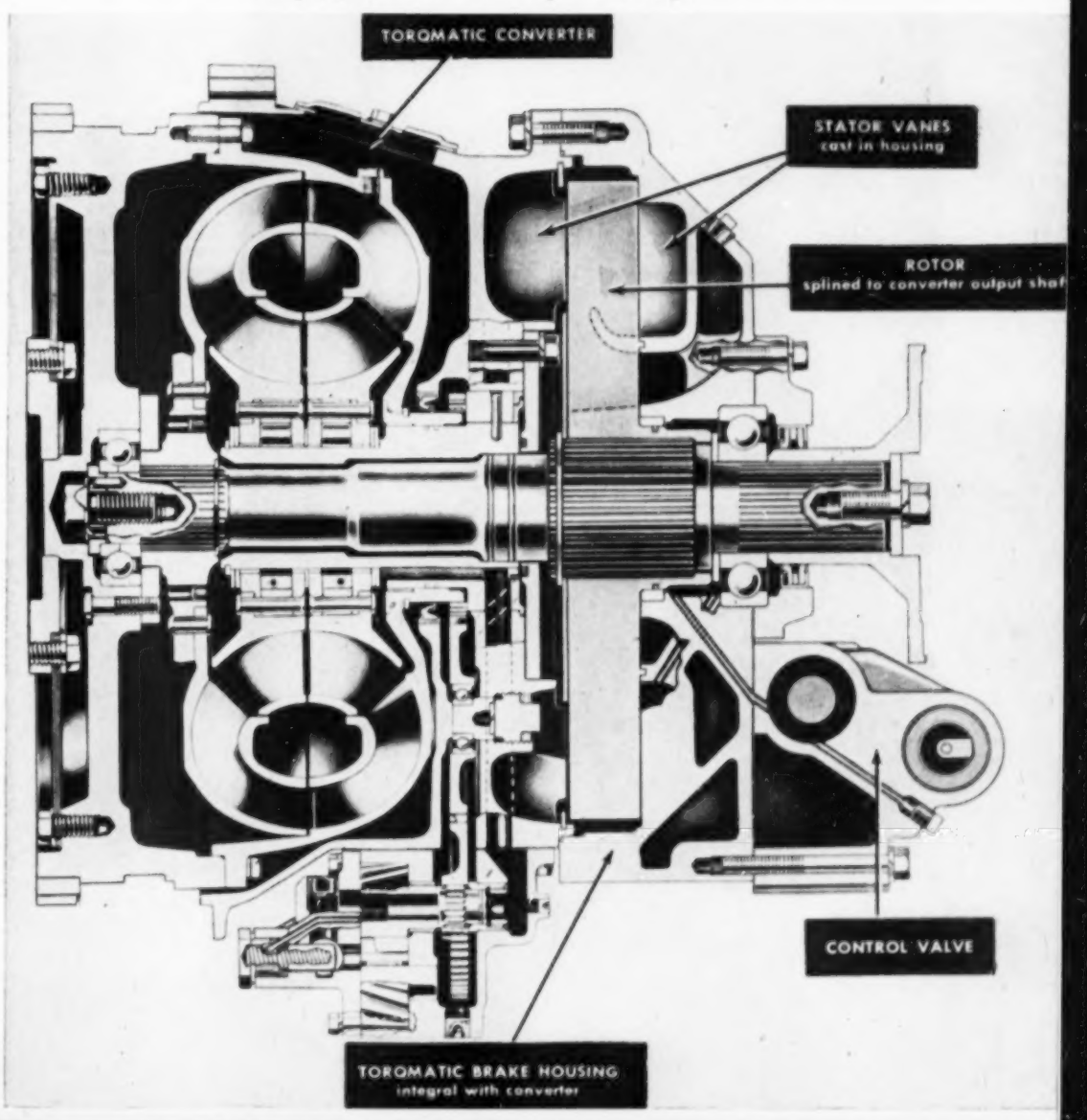


Phantom view of the Allison Torqmatic family. From left to right, the Torqmatic converter, the Torqmatic brake and the Torqmatic transmission.

and to maintain the proper oil level in the transmission. To cool the oil at maximum brake application, a heat exchanger is included. Cool oil for both the converter and transmission comes directly from the oil reservoir. Oil enters the brake from both the converter pressure circuit, to assist in the initial prime, and from the gravity feed line from the reservoir.

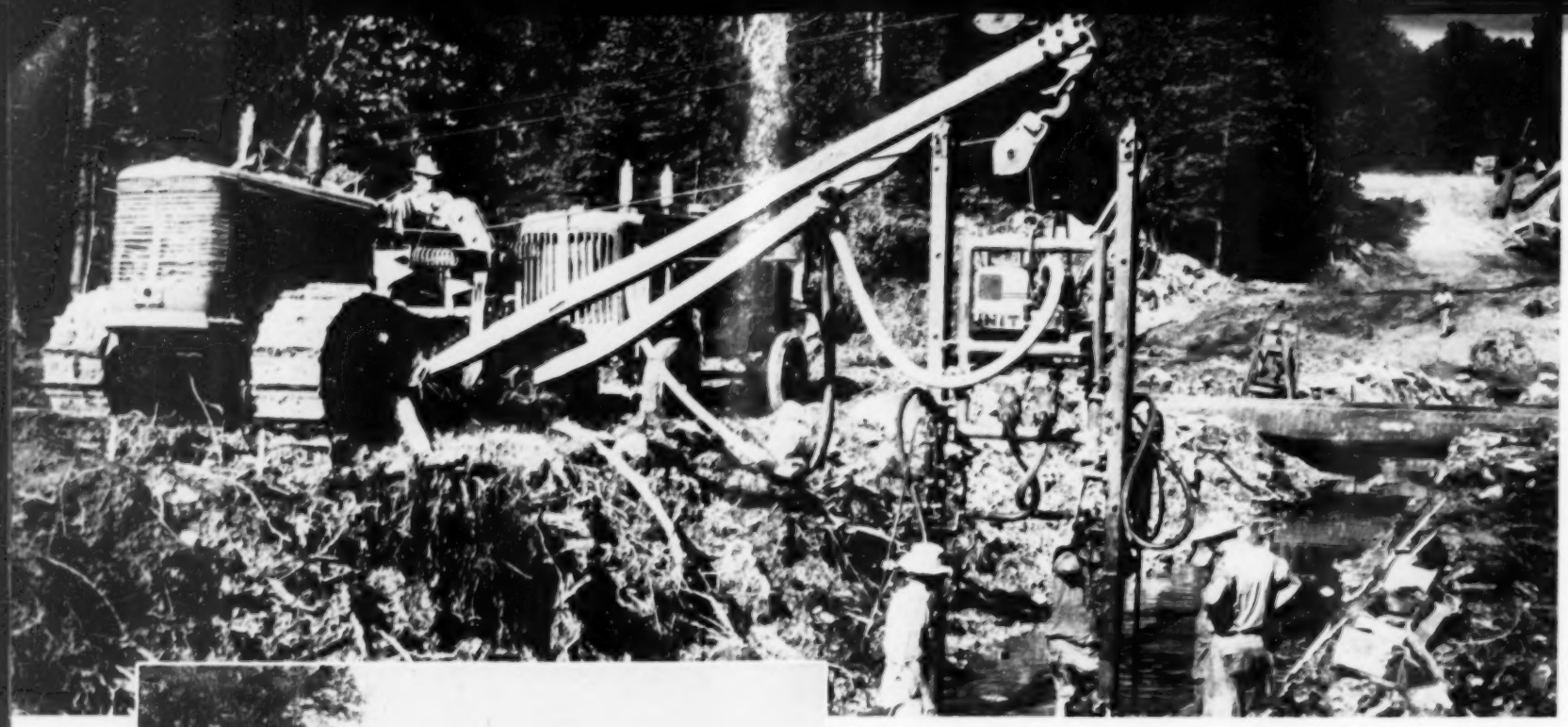
The Torqmatic brake has been undergoing a number of field service tests at various locations since August, 1952 and recently has been put into commercial production. It can be specified on new trucks or field installed on vehicles already equipped with Allison Torqmatic drives. During one of these field service tests the brakes were installed in trucks in daily operation at a Utah copper mine. After being evaluated against trucks with only conventional brakes, it was found that a truck with Torqmatic brake made 21 trips per shift on a 7 percent grade, while similar trucks without the Torqmatic brake made 14 trips per shift.

A cutaway view of the Allison Torqmatic converter with the Torqmatic brake, showing the simplicity of construction and compactness of design.



heat is harmlessly dissipated. The cooled oil is returned to the rotor cavity to repeat the cycle. The driver controls the degree of braking by letting more or less oil into the brake. When the valve is closed the oil is evacuated from the cavity by the rotor. With Torqmatic braking in the drive line, the life of service brakes is increased tremendously.

The Torqmatic brake, used with the TG 600 Series transmissions, is available with the TC 400, 600, 800 and 900 Series Torqmatic converters. The piping circuit makes it possible for a single oil system to serve the complete Torqmatic drive. The standard Torqmatic drive hydraulic circuit is used except for such changes as are necessary to make the brake hydraulic circuit integral with the converter-transmission circuit. The oil that actuates the brake is stored in a reservoir when the brake is not in use. Because the reservoir is elevated for gravity feed, air from the vehicle service brake system is used to scavenge the converter drain cavity



Rock and water made this pipeline project tougher than usual. Here an International TD-18A sideboom tractor lifts twin Worthington wagon drills and pulls a Worthington Blue Brute "600" compressor powered by an International UD-24 diesel.

Placing river weights on the 30-in. pipe was handled by a Bucyrus-Erie 22-B crane.

Clearing right-of-way involved removal of timber and brush all along the line. Here a TD-24 crawler piles stumps and brush for burning. The Unit back-hoe in background is burying unburned waste.

LAKEHEAD PIPELINE

LAYING the 635-mile, 30-inch crude oil pipeline from Superior, Wis., to Sarnia, Ont., Canada, for the Lakehead Pipeline Corp., Inc., presented a variety of problems seldom found on one pipeline project. While the most unusual operation was the long underwater crossing at the Straits of Mackinac, other sections of the line were built under equally difficult conditions.

Typical of the tougher operations was the 97-mile stretch built by Midwestern Construction, Inc., of Tulsa, Okla. This segment extended west from the straits across the swamps, hills, and forests of the Upper Peninsula of Michigan to the town of Cooks. Almost the entire length of this section was impeded by swamps, heavy forests, or rocky hills. However, even though the project was two weeks

Pipe bending on Midwestern Construction's 97-mile section was handled by this C.R.C. bending machine powered by an International U-6.

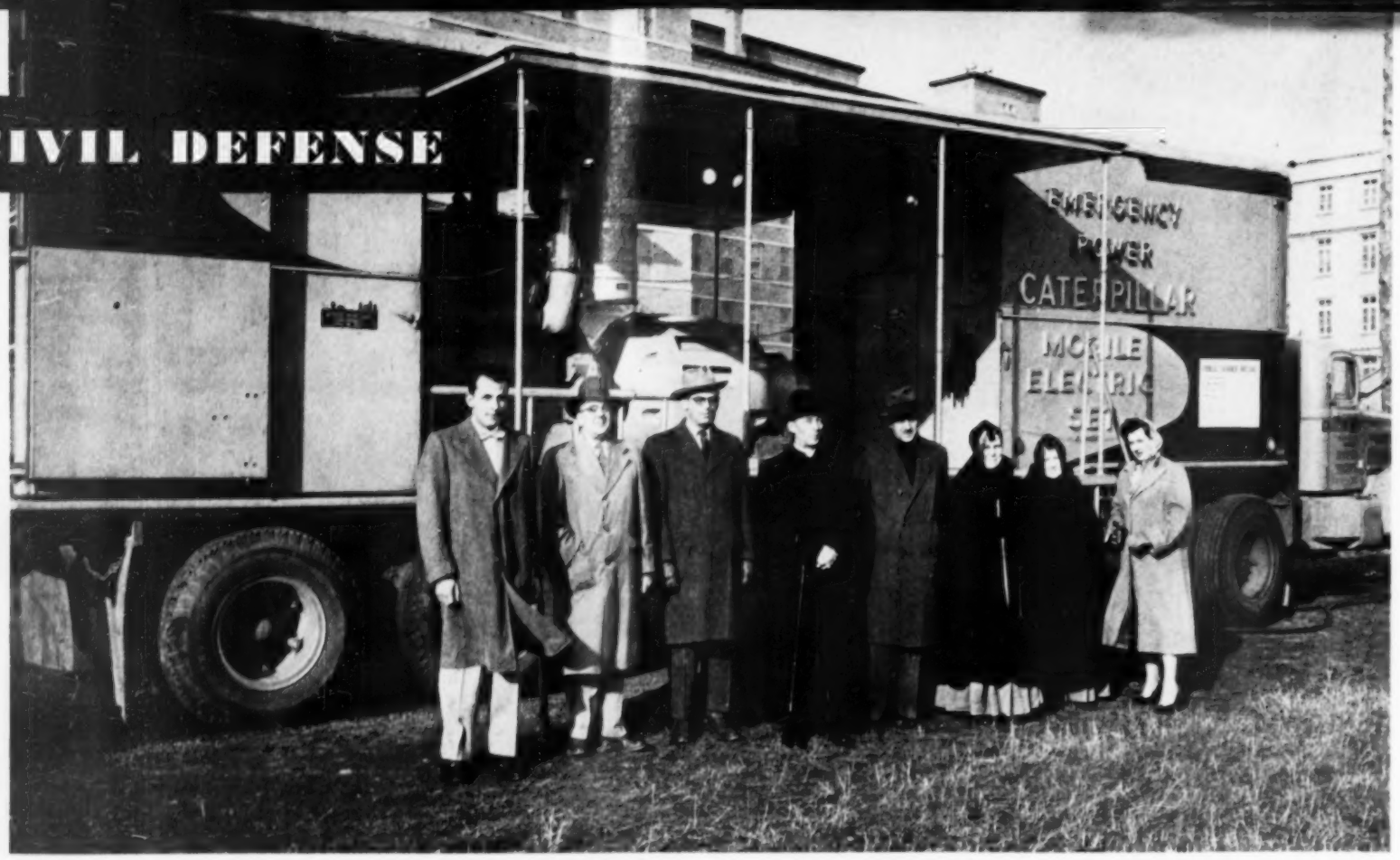
This 97-Mile Section of Pipeline Presented Problems Typical Along Its 635-Mile Length

late in starting, it was back on schedule in less than six weeks of work. The original schedule called for 30,100 feet of pipe per week but up to 58,600 feet per week were completed during the project.

Since work began last June 8, hot weather had to be considered, and such operations as lowering-in were done only when the temperature was below 75 degrees to prevent the wrapping from sliding on the pipe. Swamp areas forced the pipeline crews to pump water from the ditch into the raised end of the pipe so as to reduce its buoyancy and submerge it. In other sections, solid rock had to be blasted during the ditching operations. On these operations, International TD-18A sideboom crawlers handled Worthington twin wagon drills which drilled the holes for blasting.

This TD-24 and Superior sideboom slosh through swampy undergrowth to clean the 30-in. pipe.

This stretch was one of the smoothest encountered on Midwestern Construction's section of the pipeline. Lowering in is being accomplished by three International TD-24 tractors with Superior sidebooms.



Left to right: Bob Burdick, Caterpillar Tractor Co.; Leopold Garon, city manager; Greg Aube, Hewitt Equipment Co.; Abbot Guillaume Dionne, administrator of the seminary; Dr. Victor Lepage, mayor; Rev. Sister St. Jean Gabriel, hospital superior; Rev. Sister St. Antonio, hospital administrator and Lisette Morin of "Le Progres Du Golfe," Rimouski newspaper, pose in front of the Caterpillar D397 emergency mobile electric set.

POWER ON WHEELS

THE only illumination stemming from the dark, silent hospital came from candles which the nurses carried as they hurried back and forth in front of the windows on their missions down the long, black corridors. Suddenly, as electrical power was regained, light streamed from the windows and a great sigh of relief was felt as doctors prepared for the operating rooms and the whole hospital bustled with renewed activity. The hospital had been without heat or light for hours. On November 7 a mobile Cat diesel-electric set was rushed to Rimouski, Province of Quebec, Canada, where an explosion in the city's power plant reduced power to nearly one-half its normal capacity. The Cat D397 furnished power for the 300-bed St. Joseph Hospital as well as keeping in operation school and living facilities for more than 2,000 students and instructors in the town's school system, plus the main telephone exchange.

Mayor Victor Lepage, M.D., of Rimouski, Province of Quebec, Canada, adds the city of Rimouski to the list of cities in which the Caterpillar diesel mobile electric set has rendered emergency relief, as Bob Burdick of Caterpillar tractor Co., looks on.

Rimouski is located on the south bank of the St. Lawrence river, some 200 miles northeast of Quebec City. The 13,000 inhabitants are accustomed to power failures occasionally in their sparsely inhabited area. The lower St. Lawrence Power Co. provides power for some 9,000 square miles between the St. Lawrence river and the Chaleur Bay, and often, in isolated sections, when power lines are damaged in storms, such areas may go without electrical power for lengthy periods because of the vastness of the areas needing service. When fire broke out in the power plant, in a matter of minutes the building was enveloped in flames. The engines were damaged with heat and water, and as a result the entire 5,000 kw. produced by the plant was lost. This loss overloaded a hydroelectric plant on the Metis River near Mont Joli, 20 miles away, where a generator burned out with an additional loss of 4,000 kw. This meant almost half of the system's 22,000 kw. capacity was cut out with a result that power had to be rationed to different sections of the area. A system was developed where each section would be given power for two hours and then the power would be shifted to another section. At St. Joseph Hospital emergency operations were conducted by candle light on this 12 out of 24 hour power system.

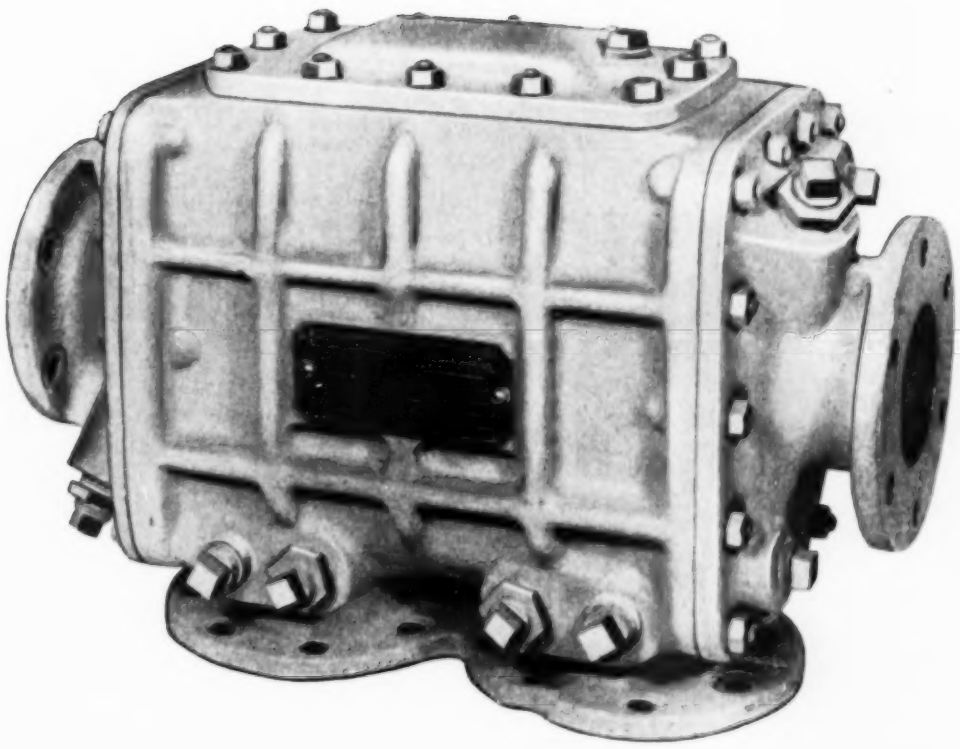
Bob Burdick and Marion Breen of Caterpillar Tractor Co. were on their way to Vermont with a huge van containing a Cat D397 diesel-electric set, capable of producing 300 kw., when they stopped in Albany, New York, and heard about the emergency at Rimouski. Because the mobile unit has been dedicated to public service wherever there is a power failure, the men immediately embarked on the 700-mile trip, arriving in Rimouski the next morning. The electric set was immediately connected and current began to flow into the 300-bed hospital and the seminary at Rimouski, which contains a staff of over 100 and boarding students numbering 900. Rev. Sister St. Jean Gabriel, superior at St. Joseph Hospital, said the big truck truly came in answer to their fervent prayers and "was sent by God."

In Rimouski, the inhabitants are very economy-minded about electricity. Therefore, that first night, the Caterpillar men noted on the meters that the engine was not running at full capacity. A hospital and seminary of such size would ordinarily use much more power than what was being used. Because of this economical way of life, the next morning, the Cat 397 was able to power additionally the archbishop's palace, housing 20 clergy members, the technical school of 350 students, the marine school of 100 students, the commerce school of 260 students, the Rimouski orphanage containing 300 children, the telephone exchange building and the cathedral and parsonage; a dramatic application of emergency diesel generators.

Dependable Heat Exchangers For Diesel Duty

Harrison heat exchangers have the capacity, compactness and durability that manufacturers of Diesel engines demand. They effectively control jacket water and lubrication oil temperatures for efficient, dependable Diesel engine operation.

Because we have been building heat exchangers for numerous applications for the past 43 years, we have developed broad engineering know-how and unsurpassed manufacturing and test facilities. We are sure that we can help you with your heat transfer problems.



HARRISON
RADIATOR DIVISION
GENERAL MOTORS CORPORATION
LOCKPORT, NEW YORK

HARRISON

RECLAIMING VALVES

Re-coating Worn Seating Surfaces of Diesel Engine Valves With Nickel Base Alloy Renews Valve Life at Fraction of Replacement Cost

DIESEL engine valves reclaimed by applying the Colmonoy Sprayweld process to coat worn seating surfaces with an impact and wear resistant nickel base alloy, are outwearing new alloy steel valves in actual running tests in 800-hp. diesel freight engines on a southern railroad line.

Colmonoy coated valves showed practically no wear after 355 days operation in the railroad diesel engine and were still serviceable. New alloy steel valves installed in the engine at the same time as the hardfaced valves, showed ¼-in. wear on the seating surfaces and were completely worn out. The 355 day period is the equivalent of about 4,000 hours of continuous operation. The valves have a 4-in. diameter and are 13-in. long. The Colmonoy No. 5 alloy, made by Wall Colmonoy Corporation, of Detroit, Michigan is applied to the worn valves by the three-step Sprayweld process at a cost of from ⅓ to ½ the price of a new valve.

In this process the worn valve seating area is first threaded along the tapered surface or grit blasted to provide the necessary mechanical bond for the subsequent metal spraying operation. Then the valve is chucked in an engine lathe or turning fixture and rotated, while the powdered No. 5 alloy is applied by a Colmonoy Spraywelder pistol supported in a tool post holder. This pistol is connected through hoses to a wall or pedestal mounted panel unit that supports a powder hopper, carburetor, air regulator, air filter and connections to oxy-acetylene tank and factory air supply lines. After the alloy has been sprayed on the valve seating surface to a thickness that will provide a finish ground No. 5 alloy thickness of 0.060-in., the pistol is swung away from the chucked valve. In the final step, the valve is rotated under an oxy-acetylene torch to fuse the nickel base alloy coating to the base metal, thus providing a fusion bonded, nonporous coating of wear and impact resistant alloy. The seating area is finish ground on a conventional external grinding machine before installation in an engine.

The No. 5 alloy applied to the diesel engine valves is a nickel base alloy containing chromium and boron. It is non-magnetic and has a Rockwell C hardness from 45 to 50 and melts at 1950°F. The alloy has excellent impact and corrosion resistance as well as excellent red hardness. Its abrasion and galling resistant qualities are very good. It can be used in cast shapes as well as in powder and bare and coated welding rod form. This Colmonoy alloy is ideally adapted to the highly stressed valve application because of its high impact resistance and red hardness. Its machinability properties, which enable No. 5 Spraywelded surfaces to be easily ground or machined with a carbide tool, also adapt it to this application since worn coated valves can be easily reclaimed by remachining and Spraywelding.

A comparison of new and Spraywelded diesel engine valves after 4,000-hour operation in the same freight engine on a southern railroad line. The new alloy steel valve, left, has worn ¼-in. and is completely worn out. The Colmonoy-coated reclaimed valve, center, shows practically no wear and is still serviceable. The valve at the right which has been reclaimed by Spraywelding and grinding, shows the appearance of the center valve before installation.

Bottom, left: **Applying the No. 5 alloy coating by rotating the valve in front of a tool post mounted Spraywelder pistol.**

Bottom, right: **Fusing the sprayed-on nickel base alloy coating by rotating the valve under an oxy-acetylene flame.**

AMYL NITRATE SOON!

Many Tests, Many Months of Actual Trial and Use in the Field — Now the Time Is Almost Here When Your Refiner Will Be Able to Offer You a Diesel Fuel with AMYL NITRATE to Increase Its Cetane Number

THE demand for diesel fuels is increasing faster than the demand for other major products from the petroleum barrel. Since 1941, it has increased six-fold, compared to slightly less than a two-fold increase for "all" petroleum products. In 1941, consumption of diesel fuel was 1.1 billion gallons, or only 4% of the gasoline market. By 1953, consumption had increased to 6.7 billion gallons, or 13% of the gasoline market. By 1960, the demand is expected to reach 9 billion gallons, or about 14% of the expected gasoline market.

Total Diesel Fuel Consumption

Year	Billion Gallons	% of Gasoline Consumption
1941	1.1	4
1953	6.7	13
1960	9.0	14

The biggest single factor in this rapid growth has been the universal acceptance of diesel-electric power by the railroads. In 1941, less than 1% of the freight traffic, 8% of the passenger traffic, and 5% of the switching service was handled by diesel-electric locomotives, consuming 11% of the total diesel fuel. By 1953, diesels were consuming 44% of the total diesel fuel and doing about 75% of the work on American railroads. Almost complete dieselization is expected by 1960, at which time the railroads should account for about 50% of the diesel fuel consumed.

Civilian automotive equipment (such as trucks, busses, tractors, and bulldozers) accounted for about 19% of the total consumption in 1953. In 1941, consumption was about 1%. By 1960, an increase to about 25% of the total is expected. Military dieselized equipment has been consuming about 6% of the total diesel fuel. Indications are that this percentage figure will remain substantially unchanged, unless we have another "all-out" war in which case it could approach the railroads' usage. Other important users of diesel fuel include the public utilities, private industry, and civilian marine applications.

To meet this rapidly expanding demand for diesel fuels, refiners are finding it necessary to increase the per barrel yield of middle distillate fuel, that is, the "middle-of-the-barrel" fraction distilling between gasoline and residual oil and including kerosene and distillate fuel oil. This increase is being accomplished at the expense of residual yield, partly through coking operations, but mainly through the increased use of catalytic cracking whose end products are essentially high octane gasoline and middle distillate fuel, as compared to lower octane gasoline and residual fuel from the older thermal cracking process. In 1941, the yield of middle distillate fuel per barrel of crude oil processed was 19%, as compared to 24% for residual fuel. By 1953, the distillate yield had increased to 26% and the residual yield reduced to 17%, with the yield of gasoline remaining substantially unchanged. By 1960, the middle distillate yield is expected to be still further increased to about 29%, with a drop in residual yield to about 13% and a slight increase in gasoline yield to about 47%.

We quote liberally from a panel discussion of DIESEL FUELS OF THE FUTURE at the S.A.E. Metropolitan Section in New York, Jan. 7th, 1954 with William H. Hubner of Ethyl Corp. moderator and Horry F. King of the Bureau of Ships; W. King Simpson of Electro-Motive Div. General Motors and Lawrence J. Grunder of Richfield Oil Corporation.

We also refer our readers to further discussions of Amyl Nitrate as a successful fuel additive which appeared in our December 1951 issue, page 80; January, May, November, 1952, pages 82, 67, 86 respectively; and April 1953, page 93.

Diesel Fuel Consumption by Uses

Use	Consumption, % of Total 1941	1953	1960
Railroad	11	44	50
Automotive (Trucks, Busses, Tractors and Bulldozers)	1	19	25
Military	6	6	6
Other	82	31	19

When consumption of diesel fuel was relatively small, and catalytic cracking was in its infancy, refiners were able to meet all requirements for diesel fuel with straight-run distillates, and consequently experienced few, if any, problems during storage and few, if any, complaints from diesel operators. The introduction of cracked distillates in diesel fuels has imparted the desirable characteristics of higher volumetric heat content and lower pour and cloud points, but it has also necessitated paying closer attention to the problems of stability in storage and adequate ignition quality.

Cracked distillates, like cracked gasolines, generally tend to deterioration in storage more readily than straight-run products, unless they are subjected to adequate refinery treatment and/or fortified with suitable stability additives. This deterioration in storage results in discoloration of the fuel and in the formation of both soluble and insoluble residues. Discoloration is objectionable mainly from a sales point of view. Soluble residue, in general, does not appear to be harmful, although there is a belief that too high a soluble gum content might cause injector sticking. Insoluble residue, on the other hand, is likely to cause filter clogging, with resultant engine stoppage from fuel starvation at inconvenient times.

Per Barrel Yield of Petroleum Products

Year	Yield, % of Crude Middle Distillate*	Residual	Gasoline
1941	19	24	44
1953	26	17	45
1960	29	13	47

*Includes kerosene and distillate fuel oil.

The mechanism of instability in storage is not too well understood. In thermally cracked distillates, the direct oxidation of olefin hydrocarbons is believed to be the cause. But in catalytically cracked distillates, the principal factor appears to be the oxidation of certain reactive sulfur and nitrogen compounds which, in turn, act as catalysts to accelerate the oxidation of certain aromatic hydrocarbons. Closely related to the problem of instability is the phenomenon known as incompatibility, wherein two fuels which are stable by themselves become unstable in storage when blended. This is believed to be due to the resultant lower solubility which precipitates out certain relatively insoluble materials. Two types of stability-compatibility additives have been developed, and a number of such additives are in commercial use today. One type consists simply of oil-soluble dispersing agents which control the particle size of the insoluble residue, so as to pass through the fuel filters rather than to clog them. The second type combines dispersant properties with the ability to decrease the rate of formation of the insoluble residue.

No one additive appears to solve all stability-compatibility problems in all types of distillate fuels. For example, in fuel No. 1, additive B was found to be successful in maintaining the insoluble residue at a relatively low level over a period of 12 weeks' storage in glass bottles at 110° F., but additive A was not successful. In fuel No. 2, the reverse was true. The ignition quality of straight-run distillates, expressed in terms of cetane number, varies from about 33 to 68 depending upon hydrocarbon composition, with the paraffins rating the highest and the aromatics the lowest. Catalytically cracked distillates have ignition qualities 5 to 15 cetane numbers below straight-run distillates from

the same crude source, depending upon severity of cracking operation. Thermally cracked distillates are about another 10 cetane numbers lower.

Refiners with relatively high cetane number straight-run distillates have no difficulty in producing Navy 50 cetane number diesel fuel which specifies a straight-run base. Such refiners are also able to blend a portion of cracked material and still meet the cetane requirements of automotive and railroad diesel fuels which generally permit the use of cracked products. On the other hand, cetane numbers become a problem to those refiners with relatively low cetane number straight-run distillates, to those refiners with a relatively large percentage of cracked products to blend into finished diesel fuel, and to those refiners who prefer to transport, and to store at terminals, middle distillate fuel suitable for use either as heating oil or as diesel fuel. Such refiners have several choices of solution. They can up-grade to the desired cetane level at the refinery by acid treating or solvent refining, by the use of cetane improver additives, or by a combination of refinery and additive treatment; or they can up-grade to the desired cetane rating at terminals, as required, through the use of additives.

Ethyl Corporation has been working for many years in the field of diesel fuel additives, and has developed a cetane improver additive designated DB-36 amyl nitrate. For any additive to be acceptable to the petroleum industry, to engine manufacturers, and to diesel operators, alike, it must first be subjected to extensive laboratory and field service tests. During the past three years, DB-36 amyl nitrate has been subjected to such tests. The first tests consisted of a number of 250-hour dynamometer runs in Ethyl's Detroit Laboratories, to prove that amyl nitrate had no harmful effect on engine durability. Next a year's cooperative test was successfully completed in a squadron of submarines; and amyl nitrate is now being used commercially in Navy 50 cetane diesel fuel on the West Coast.

Simultaneously with the Navy tests, three 50,000 mile runs were successfully completed in each of two diesel trucks operating, as a pair, out of Ethyl's San Bernardino Laboratories; and amyl nitrate is now used commercially in premium-grade automotive diesel fuel on the West Coast, in city-bus fuel on the East Coast, and in regular automotive diesel fuel in the Mid-West and Canada. Finally, a year-long cooperative test has just been completed on two railroads, one in the relatively warm, low-altitude Gulf Coast area, and one in the relatively cool, high-altitude Rocky Mountain area. The results are presently being studied by the cooperating organizations, with use in railroad diesel fuel being dependent upon a favorable analysis of the results.

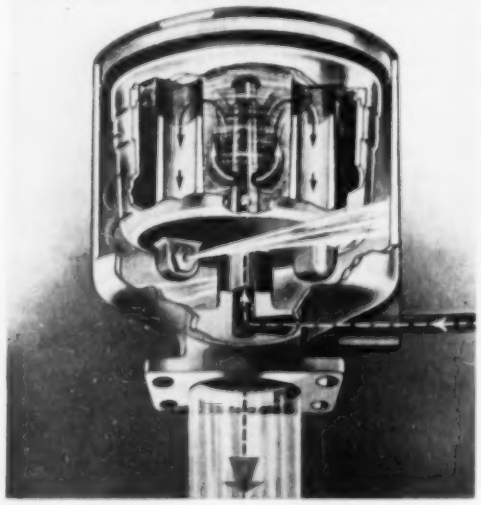
Although ease of ignition plays a very important part in the combustion process, cetane number does not appear to be the controlling factor so far as completeness of combustion is concerned. Perhaps this is an engine design problem, or perhaps the desired goal can be accomplished through the fuel additives' route. Research efforts on both approaches to the problem are being aggressively pursued, with a goal of greater "smoke-limited" horsepower so important to the diesel operator.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

GLACIER CENTRIFUGAL OIL FILTER

THE advantages of oil cleaning by centrifugal separation are well known, but it has not been practicable in the past to employ a centrifuge for automotive type engines due to the space and weight factors involved and the necessity for an additional drive. The Glacier Metal Company has introduced a compact and effective centrifugal filter which is easily fitted to most engines in the 100 to 200 bhp. range and which requires no motive power other than that desired from the lube oil circulating pump. The filter operates on the by-pass system but it is claimed that the oil flow is considerably greater than through a pack-type filter designed for similar duties.



Sectional drawing of the Glacier centrifugal oil filter showing the principle of the filter.

The sectional drawing shows the rotor with cap, which rotates about the spindle. Oil enters the rotor through holes drilled in the hollow spindle connected with the oil supply by means of a passage in the filter body. The oil fills the rotor and then escapes under pressure down the stand pipes in the rotor and out through the nozzles or high speed jets, back to the sump through the base of the filter body. The reaction of these jets spins the rotor at high speed, when the resulting centrifugal action causes particles in the oil to be thrown to the sides of the bowl, where they are deposited in the form of a black rubber-like layer, with sufficient adhesion to resist being washed off. Since the jets provide the only oil outlet from the rotor, it will be seen that the oil leaving the jets has been subjected to the centrifugal action and has therefore been filtered. The filter incorporates a cut-off valve located in the filter body. This valve is designed to stop oil passing to the filter when pressure in the lubricating system falls below a predetermined level and thus safeguard the engine from oil starvation. Normally the valve would be set to cut off the flow from the filter when the oil pressure falls below 15 psi. though it is to be noted that for efficient filtration the minimum oil pressure to the filter should be 25 psi. At the lower pressures the filter will continue to operate but with proportionately reduced efficiency.

Components of the Glacier centrifugal filter. Note the extreme simplicity of construction.

Special advantages claimed for the filter are: 1. The absence of any mechanical drive for the filter rotor. 2. Easy inspection and cleaning. 3. There is no filter element requiring renewal, so that running costs are virtually nil. 4. The particle size which is separated is much finer than that which will pass through an ordinary pack-type filter. 5. The cleaned oil returning to the engine sump is not required to pass through the dirt extracted.

The dirt capacity of the rotor bowl is 20 cu. in. which is sufficient to enable a normal engine to operate for a prolonged period without cleaning. The filter will continue to function even when a layer of sludge of 1 in. thickness has been deposited, though it is recommended that cleaning should be carried out when a thickness of ¾ in. has been reached.

Dirt collected in the centrifugal filter's rotor with the oil flow unimpaired.

With some designs of pack-type filters it has been suggested that additives in the lubricating oil may be removed during the filtering process. Tests claim to have shown that the Glacier Filter will not remove unused additives which are soluble in the lubricating oils. In service, some proportion of the additive, having performed its function, may become attached to agglomerates of carbonaceous and other matter which may be centrifuged out by the filter, but the additive so removed has already served its useful purpose. If oils containing colloidal graphite are used, a small proportion of the graphite is separated out by the filter, but the effectiveness during the running-in period is not impaired by the fact.

Sales Engineer Appointed

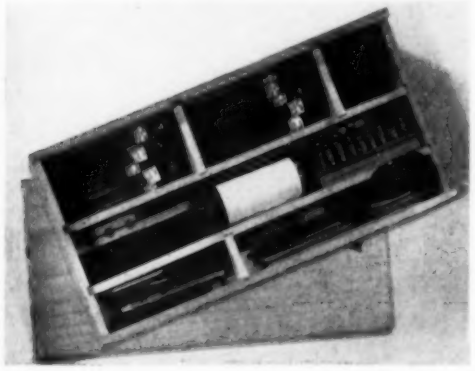
Walter C. Severin

Walter C. Severin has been appointed sales engineer with the engine division of The National Supply Co. Mr. Severin is attached to the office at Portland, Ore. He rejoined National Supply after additional service with the U. S. Navy. Earlier he was with the Venn Severin Machine Co. He is a graduate in electrical engineering of Northwestern University.

New Automatic Air Filter

Announcement of a new "pulse-action" automatic air filter has been made by Air-Maze Corporation, Cleveland, Ohio. The filter features a traveling curtain of metal air filter panels that are automatically cleaned and then coated with adhesive. Thus, air cleaning efficiency is always at maximum and air resistance always at minimum. A new type of actuating mechanism, consisting of an air piston and an overriding clutch provides positive action, eliminating shear pins, alignment problems without having any electrical connections in the air stream. Full description is available from the manufacturer by writing for catalog AMC-1253.

Diesel Nozzle Cleaning Tools



A comprehensive line of tools for cleaning all commonly used diesel nozzles and injectors, has been developed by Bacharach Industrial Instrument Co., Pittsburgh 8, Pa. There are 58 special-purpose tools which can be ordered individually or in a variety of assortments, conveniently boxed as shown. Standard kits are available for the pintle type nozzles used on farm tractor diesels, Bosch and Bendix orifice type nozzles, International-Harvester and Caterpillar tractor nozzles, Cummins injectors, and General Motors injectors. Each tool is said to be needed for a specific cleaning operation for which standard shop equipment is not adequate. The use of these tools is reported to enable mechanics—even if they have only limited diesel experience—to clean nozzles and injectors completely, and accomplish finished results that will meet factory-precision standards.

Fairchild Acquires Speed Control Corp.

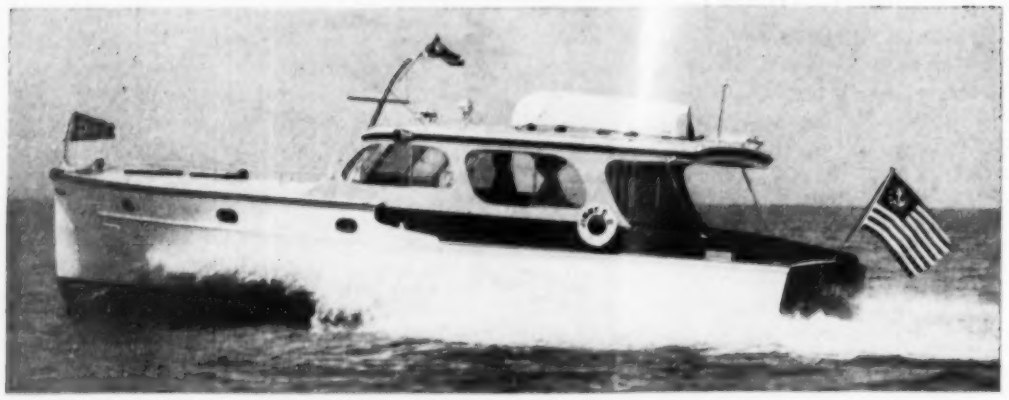
R. S. Boutelle, president of Fairchild Engine and Airplane Corporation, has announced that the Fairchild Board of Directors had approved final plans to purchase substantially all of the assets of the Speed Control Corporation of Wickcliffe, Ohio. Speed Control is a highly skilled technical organization engaged in the development and production of devices which provide speed control, both mechanically and electrically, of power output through an infinite speed range from any given source of supply.

Under Fairchild, Speed Control will operate as a separate division at its present location, and will continue to produce all units now on order. Other plans provide that volume production of Specon units will be undertaken at the Fairchild Engine Division, Farmingdale, Long Island. Mr. Boutelle stated that the Fairchild interest in Speed Control stemmed from a strong desire to increase the company's line of commercial products. He added that the present development work of the new division is almost entirely commercial; however, there are a tremendous number of applications of the speed control principle which are of interest to the military services, and Fairchild will encourage this interest to its fullest extent possible.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

Jimmy D Came To Florida

By Ed Dennis



The *Jimmy D II* powered with the new model 4-71 inclined General Motors diesel engines on her trial run.

***Left to right:* Ed Dennis, Florida correspondent for DIESEL PROGRESS; C. E. Bentley, sales manager for Detroit Diesel Engine Div., GM Corp.; George L. Schaeffer, skipper of the *Jimmy D II*, also with the sales dept. in Detroit; John Huglen, manager of the Miami branch of the Florida Diesel Engine Sales, Detroit Diesel Engine Div., General Motors Corp., discussing the *Jimmy D*'s power merits.**

THE *Jimmy D II* was just a "snow bird" from the cold Yankee country that came for a cruise in the warm blue waters that surround the State of Florida. For several weeks I noticed the Florida papers heralding the arrival of the *Jimmy D II*. On October 15th she arrived in Jacksonville after a lengthy trip from Detroit via the Great Lakes, the Erie Canal and then down the Eastern coastline to Florida. Twenty-three days for the trip stopping enroute for demonstrations at various cities. I jumped at the chance when John Huglen, manager of Miami branch of the Florida Diesel Engine Sales of the Detroit Diesel Engine Div. of GM phoned and asked if I would like a ride.

It was a typical sunny Florida day as we left the boat slip and headed down the Miami River with the twin GM diesels humming a steady rhythm at 800 rpm. As we hit the mouth of the river and entered Biscayne Bay, George Schaeffer, our youthful skipper, upped the engines to 1100 rpm. I noticed the lube oil pressure raise to 40 lbs. and the temperature raise to 170 degrees, the diesels were still singing a sweet tune. Ten minutes later we entered the sea channel and Schaeffer opened her up to 2100 rpm. She cut a neat figure going through Government Cut towards the open sea.

Main propulsion is provided by a pair of the new General Motors series 71, 4-cylinder inclined diesel engines each with a total displacement of 283.7 cubic inches. At 2100 rpm. they have a rated shaft horsepower of 138. The engines are equipped with General Motors hydraulic clutch and 1.5:1 reduction gears, driving 22x22 Columbian propellers through Goodrich cutless bearings. Delco Remy 12 volt batteries, starters and generators are used. They are using #30 Texaco diesel detergent lubricating oil. Her fuel consumption at 2100 rpm. or 23 miles per hour was a gallon per mile or 23 gallons per hour top speed. At cruising speed of 1900 rpm. the fuel consumption was approx. one gallon per mile and a half.

The *Jimmy D II* left Miami the first part of December for Stuart where she crossed the State of Florida via the St. Lucie canal, Lake Okeechobee and the Caloosahatchee River for a trip up the west coast of Florida and was back in time for show purposes at the Miami International Boat Show February 19th through the 24th.

Injector Tip Concentricity Gauge

To check concentricity between the injector tip and injector nut after assembly, an injector tip concentricity gauge has recently been added to its large line of diesel service tools by the Kent-Moore Organization, Detroit, leading manufacturer of special automotive service tools and equipment. Bearing the catalog number J 5119, the gauge is applicable to injectors used in General Motors Series 71 diesel engines. To insure correct clearance between the injector spray tip and the cylinder-head injector hole tube with the injector properly installed, the spray tip must be concentric to the injector nut within 0.008 in. The "run-out" of the injector spray tip may be measured by placing the assembled injector in the gauge (as shown in the accompanying photograph), then setting the dial indicator at zero, and rotating the injector in a complete circle and noting the total reading.

If the total indicator reading is greater than 0.008 in., the injector should be removed from the gauge, the injector nut loosened, the spray tip re-centered, the injector nut tightened, and the "run-out" re-measured in the J 5119 Injector Tip Concentricity Gauge. Inquiries concerning J 5119 should be addressed to the Kent-Moore Organization, Inc., 5-105 General Motors Building, Detroit 2, Mich.

Delivers Batteries

Nife Incorporated, of Copiague, Long Island, has completed delivery of 30 diesel starting batteries of nickel cadmium type to the Indonesian State Railroad for locomotives in passenger and freight traffic. These batteries were manufactured for 1600 hp. General Electric Locomotives, and are of a design having extremely low internal resistance. Each battery consists of 48 cells, 64 volt system, and has a capacity of 280 amperehours at the 2 hour discharge rate.

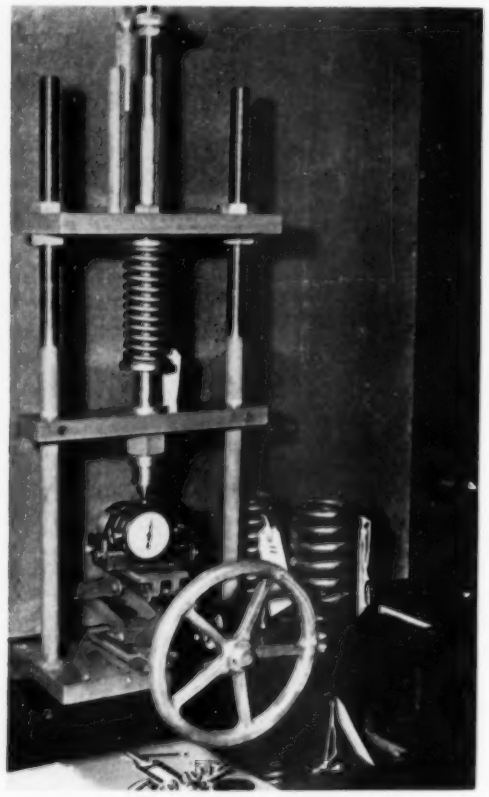
Elected to Board of Directors

N. F. Adamson, vice president, Sales, of the Twin Disc Clutch Company, was elected to the Board of Directors at a recent board meeting in the company offices at Racine, Wisconsin, P. H. Batten, chairman of the board, has announced. He will replace Grover C. Weyland, deceased. Mr. Adamson joined the company in 1925 as a member of the Engineering Department. Later he served as a sales engineer working out of the company's Cleveland office. He was appointed chief engineer in 1935, and became sales manager in 1944. In July, 1945 he was elected vice president in charge of Sales and Engineering.

During his service with the Twin Disc Clutch Company, Mr. Adamson has made many contributions to the development, design and application of the company's extensive line of friction clutches and fluid drives used by leading manufacturers of industrial machinery. Twin Disc products are produced in plants in both Racine and Rockford, Illinois, and manufactured under license by British Twin Disc & Clatifiers, Ltd., London, and by Niigata Converter Company, Ltd. of Tokyo and Kamo, Japan.

Mr. Adamson has also been instrumental in building the company's world-wide sales and service facilities, and has been very active in the field, working with the company's eight factory branches, sixty parts stations and eighty-five hydraulic dealers located throughout the United States and Canada. In recent years he has also worked with, and expanded, sales and service facilities in Europe and Latin America. Mr. Adamson has been a member of the Milwaukee Section of S.A.E. since 1934, and is a member of the A.P.I. and the Farm Equipment Institute.

Testing Compression Coil Springs



An inexpensive and simple way of testing compression coil springs has been developed by the Farris Engineering Corporation of Palisades Park, New Jersey, manufacturers of precision safety and relief valves. The accompanying photograph shows this new method of operation, a description of which is as follows: Firstly, a Dillon mechanical pressure gauge is placed on a scissors-type jack to which a hand wheel has been attached. A hydraulic jack is also used at times. The spring to be tested is placed on a movable platform, or spring washer, which is part of a telescoping bar. Turning the hand wheel raises the jack, and force is applied through the gauge to the telescoping bar, thus compressing the spring upwardly against the underside of a fixed platform. A fixed scale adjacent to the moving bar permits measurement of deflection. By this means, an accurate reading of load and deflection characteristics of the spring is quickly obtained.

According to Mr. C. G. Weber, chief engineer of Farris Engineering, not only is this arrangement simple to construct from available shop materials, but a considerable saving is achieved over other test methods as the cost of the pressure gauge is much less than that of regular spring testing machines. The device is quickly adapted to test various sizes of springs. Although the Dillon pressure gauge illustrated is a 0-2500 lb. capacity unit, 8 other capacities are also available ranging from 0-10 lbs. up to 0-5000 lbs. Approximate net weight of each is 2½ lbs., and dimensions are 4¾ in x 2⅛ in. x 3⅛ in. Accuracy is guaranteed to 1% ± indicated reading. Maximum indicator is optional.

Florida Diesel News

By Ed Dennis

THE recently launched 59 ft. tug *Milka M* is attracting a lot of attention along the Gulf Coast; 600 bhp. from the two series 35 Brown Boveri supercharged Atlas Imperial diesels, 4:1 Snow Nabstedt reduction gears, Hallett generating set and Quincy compressor.

KENNEDY Marine Engine Co. of Biloxi, Miss., supplied the General Motors model 6-110 diesels from the two twin screw oil exploration vessels; 90 and 110 ft. in length, both have GM model 51, 12½ kw. generating sets.

LAYING a 72 inch sewer main, W. T. Price Dredging Co.-Blythe Bros. are using a GM 4-71 with a 12 in. pump; a ¾ yd. Northwest dragline powered with a GM 3-71 and 2 Murphy powered Northwest draglines.

A FAIRBANKS-MORSE model 31-A-8½ in the shrimp trawler *White Gold* rated at 375 hp. at 540 rpm.

CUMMINS Diesel Engines of Fla. repowered a switching locomotive at a chemical plant in Brunswich, Ga., with a model HRBS 600 rated at 225 hp., they also repowered the *Audery Jean* with a JBS rated at 150 hp.

AN ATLAS Imperial model 45-M-6 rated at 300 hp. at 750 rpm. for the 80 ft. *Nellie Pet*, with Snow Nabstedt reduction gears; a Lister 8 hp. generating set is included in this fine installation.

A MURPHY diesel rated at 190 hp. was included in the outfitting job done at Dade Drydocks on Charles Ludwig's shrimp freezer, the 73 ft. *Louanna;* her capacity will be 30,000 lbs. of shrimp.

FOR irrigation purposes in the Redland farm district, a portable pump mounted on a 4 wheel trailer powered with a GM model 4-51 diesel and GM power-take-off, Fulflo fuel filters and Purolator lube oil filter from Florida Diesel Engine Sales at Miami.

THE *Jolly Roger* launched at Sarris Shipyard in Tarpon Springs, is powered with a Caterpillar model D326 and owned by Ralph Combs of Marathon; the *Seminole* also received a Cat. model D337. Both installations were engineered by Shelley Tractor & Equipment of Miami.

AT POMPANO Beach Zinke-Smith took delivery of a model 6 Northwest dragline powered with a model 20 Murphy 6 cyl. diesel rated at 135 hp. from Florida Georgia Tractor Co.

THE Onan diesel generating sets model 3 DSP on the *Virginia Bradley* and *Helen A III* were supplied by Kennedy Marine Engine Co. of Biloxi, Miss.; who also supplied the General Motors diesels for their propulsion; the latter vessel is owned by C. L. Rohr Coal Co. of Clay City, Ind., and will operate out of Fort Myers.

DIESEL Briefs: The *J. G. Macallon* a cargo vessel from Nassau with a 400 hp. Enterprise; *Our Gang* a 63 ft. job with a 176 hp. Buda and the beautiful *Anakita V* an 82 ft. yacht powered with 2 GM 6-71's, cruising in Florida waters.

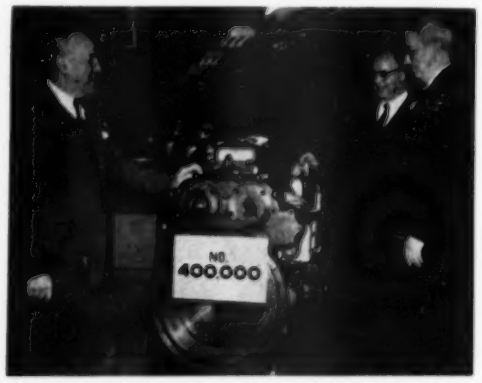
Vice President

Henry H. Howard

Henry H. Howard has been elected a vice president of Caterpillar Tractor Co., it is announced by President Louis B. Neumiller. In his new position, Mr. Howard's principal responsibility will be the administration of the company's recently created engine division, Mr. Neumiller said. Mr. Howard has been with the company 27 years, most of which have been spent in the sales management field. He served as director of sales from 1949 to August 1, 1953, when he was named manager of the engine division. While maintaining his administrative responsibilities at Caterpillar, he has twice served the nation in time of war. He was consultant to the Tank and Combat Vehicle Division of the U. S. Ordnance Department from February, 1942, to July, 1943, and served for 13 months, beginning in December 1950 as consultant to the Department of the Army, G-4.

A licensed pilot, Mr. Howard is deeply interested in private and commercial aviation. He is former chairman of the Greater Peoria, Ill., Airport Authority. He is also active in the American Ordnance Association. A graduate of the University of California, Mr. Howard joined Caterpillar in May 1926 at San Leandro. He was an export representative in Australia from 1928 to 1931, and then worked four years in the Merchandise Department and as assistant to the vice president in charge of sales. In 1935, he was named manager of the governmental sales division and, from 1937 to 1942, was manager of the engine sales department. He was general sales manager from 1943 to 1949.

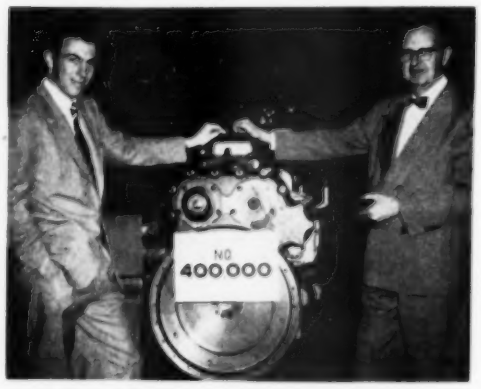
400,000 Diesel Units



In the photo with the milestone engine (left to right) are Detroit Diesel's W. T. Crowe, general manager, E. F. Bentley, general sales manager and A. F. Davis, works manager.

The 400,000 diesel engine to be produced by the Detroit Diesel Engine Division of General Motors in the 15 years of its existence came off the assembly line in Detroit in January. The engine, a six-cylinder model in the "71" series, was shipped to a crane manufacturer and boosted the cumulative power output of engines produced by the Division to approximately 60,000,000 horsepower. According to Division spokesmen this 15-year engine production figure is significant because only 60,000 diesel units had been produced by American manufacturers altogether in the 40 years prior to 1938 when Detroit Diesel entered the field.

The same engine, this time with James W. Brown, Detroit Diesel's advertising manager (right) and Bruce Wadman, Mid-West editor of DIESEL PROGRESS, helping to celebrate this milestone in the history of diesel production.



Appointed to Pensacola Branch

Appointment of Marvin R. Clemons to a new branch sales office in Pensacola, Florida has been announced by The Trane Company, manufacturers of air conditioning, heating and ventilating equipment. The Pensacola sub-office will operate in conjunction with the Birmingham, Alabama sales office. Mr. Clemons is a graduate of Louisiana State University and was formerly associated with the firm's New Orleans sales office.

Exit Steamers

The steam locomotive is a thing of the past on Great Northern Railway's four westernmost divisions. Except for the 74-mile electrified zone in Washington state's Cascade Mountains, diesel-electrics now are handling all trains and switching on the Cascade, Klamath, Spokane and Kalispell divisions. These headquarters respectively in Seattle, Wash., Klamath Falls, Ore., Spokane, Wash., and Whitefish, Mont. The completely dieselized divisions have 2,300 miles of the railway's 8,300-mile system. They include all lines in Washington, Oregon, California, Idaho and British Columbia and in Montana extend eastward along the transcontinental line to Havre.

Both diesel-electrics and steam locomotives continue in use on the five eastern divisions. On these, diesels handle all passenger trains and the bulk of the freight trains and switching. Great Northern has 546 diesel-electric units and 340 steam locomotives. Thirty-seven more diesel units will be received during 1954.

Hydra-Drives, Inc.

P. R. Youngs III

W. A. Eskridge

Hydra-Drives, Inc. has been formed in Tulsa for the sales and service of torque converters to the oil industry in the mid-continent area. The company will specialize in the converting of existing equipment from straight mechanical drive to hydraulic drive for greater operating efficiency and the sale of hydraulic drives for new equipment. W. A. Eskridge, vice president, will be in charge of industrial sales and P. R. Young III, vice president, will be in charge of automotive sales. Hydra-Drives, Inc. has been appointed sales and service representatives for Schneider Manufacturing Corporation, a pioneer in the field of torque converters, and Torcon Corporation, manufacturer of heavy duty torque converters. Both Mr. Eskridge and Mr. Young have had long experience in the field of hydraulics. Mr. Eskridge, prior to the formation of Hydra-Drives, Inc. was vice president of Service Engineering Co. Before that he was dealer sales and service manager for Twin Disc Clutch Company.

Mr. Youngs was for many years associated with Schneider Manufacturing Corporation in a sales capacity. Last year he represented both Schneider and Torcon Corporation as regional sales representative. At the present time the company is engaged in appointing sales and service representatives throughout the mid-continent area.

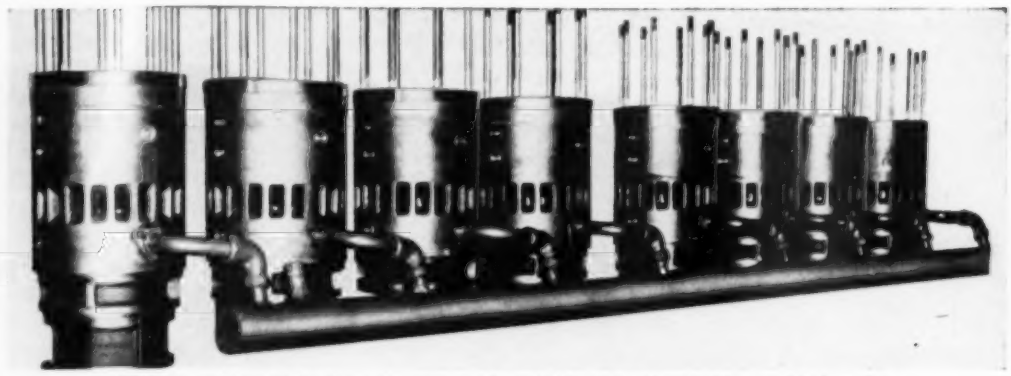
Twin Disc Appointments

Appointment of Jack N. Yetter to manager of sales promotion of the Twin Disc Clutch Company, with headquarters at the company's home offices at Racine, Wisconsin; and of Mel H. Woodward as Mr. Yetter's successor as manager of the Tulsa, Oklahoma district, is announced by N. F. Adamson, vice-president, charge-of-sales. The Twin Disc Clutch Company, with plants in Racine, Wisconsin and Rockford, Illinois, manufactures friction and fluid drives used in leading makes of powered industrial equipment.

Mr. Yetter's previous duties with Twin Disc have been district sales engineer, assistant district manager, and District manager of the Tulsa office. Before joining Twin Disc in 1949, he was with the Link-Belt Company as district sales engineer, operating in the Southwestern Division out of Dallas. During World War II, he served in the U. S. Army Air Corps and received the Distinguished Flying Cross. He is a graduate of Texas A & M, and holds a B.S. degree in Aeronautical Engineering.

Mr. Woodward started with Twin Disc at the Tulsa office as installation engineer. Later he was appointed district sales engineer, and assistant district manager. During World War II, he served with distinction in the Flying Tigers. After the war he was field service representative for Curtis Propeller Division of Curtis-Wright and later operated his own fabrication plant on the West Coast. Both men have had broad experience in the application of friction and fluid drives to both engine- and motor-powered machinery, particularly on equipment used in the oilfields.

TO ALL RAILROAD MAINTENANCE MEN

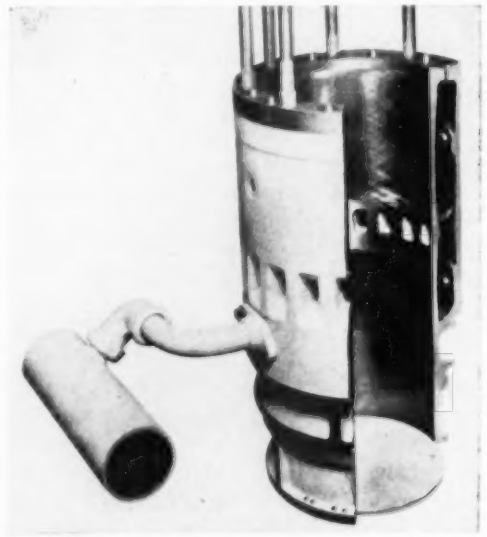


Relative position of the liners, jumpers, and manifold of the Hunt-Spiller modified cooling system when installed in the EMD 567 Series engine.

IF your E.M.D. engines are getting old enough to send to one of the E.M.D. rebuilding shops, then this item won't help you very much because it will be more efficient and more convenient to have the original manufacturer make the change which will insure a dry crankcase insofar as water is concerned.

If your E.M.D. units are comparatively new but are due to go to your own maintenance shops for fairly substantial overhaul, then this complete kit designed and produced by Hunt-Spiller Manufacturing Corporation will enable you to eliminate water leakage to the crankcase. The idea behind the kit is quite feasible because as you know, the E.M.D. 567 engine has an existing water inlet manifold, one for each bank of cylinders in the air box which runs from the pump wall to the center of the water deck. This can be removed and replaced with a manifold which extends the full length of the cylinder bank (see illustration #1). A series of jumpers then connects the liners with the manifold through the lightening in the outer wall of the "V" frame. In developing this kit it was found necessary to alter the shape of the lightening hole slightly in order to locate the water connection as low as possible on the liner. It also will be necessary in installing this kit to connect the water drain pipe which runs from the upper to the lower water deck to the inlet water manifold. Having these factors in mind, Hunt-Spiller redesigned and closed off the bottom of the cylinder liner and laid out a water inlet manifold with jumper water inlet connection to the lower end of the liner water jacket that would fit into existing engines with a minimum of modification. The liner was redesigned and the bottom of the water jacket was closed off. Careful calculation determined the size inlet manifold and jumper connections that would insure a uniform flow through the liner jacket. Too high a velocity of water flowing through the jacket would lead to air pockets, too slow a flow would permit surface boiling. Either condition would create hot spots on the liner.

Hunt-Spiller in developing this kit sectionalized and completely inspected liners which had run 100,000 miles of severe service after applying this modified cooling system. It was noted that there was no indication of hot spots, no corrosion buildup in the water passages, no evidence of pitting and erosion. In short, this system not only provided a means to eliminate water leaks into the lube oil, it also did a very adequate job of cooling the liner. These first units were tried out in 1952. After they had proven it to be an acceptable cooling system they began to study what simplifications could be made to eliminate screw-in fittings, gaskets, excessive welding and relatively expensive fabrication. By June of 1953 they had completely redesigned the water inlet manifold, the water jumper and the jumper connection on the liner. The new design incorporated a fabricated inlet water manifold of such diameter as to insure adequate water pressure to all liners in the bank. The jumper was so arranged as to eliminate all threaded fittings.



Section view of liner and manifold of Hunt-Spiller modified cooling system. Simplicity and flexibility of jumper arrangement is permitted by elimination of threaded connections. Instead, a Dresser no-thread fitting and gasket is utilized. This maintains a flexible water-tight vibration free arrangement.

This was accomplished by using special fittings with wedge-shaped, protected, rubber gaskets. The liner connection was made with a wedge-shaped rubber gasket sealing the jumper pipe in the liner with a pressure flange. The gaskets and fittings were designed and supplied by the Dresser Industries, Inc. of Bradford, Pa.

This complete kit for modifying the cooling system of the E.M.D. engines was exhibited in model form at the 1953 Railroad convention in Atlantic City. By the end of 1953, 18 class one railroads had purchased this modification and road tests at this date are proving quite satisfactory.

Nordberg Distributor

Appointment of J. Frank Knorr Incorporated, Miami, Florida, and their affiliate J. Frank Knorr of Tampa, Inc., as distributor for Nordberg type IFS engines in Southern and Central Florida is announced by the Nordberg Manufacturing Company, Milwaukee 1, Wisconsin. J. Frank Knorr, Inc., 528 N.W. Seventh Avenue, Miami, Florida and 911 E. Platt Street, Tampa, Florida, have completed a program of plant expansion at their Miami location on the Miami River at Seybold Canal. Established in 1928 at the present location, this organization has expanded its activities in both the marine and industrial engine and equipment field. During the summer of 1952, a new and up-to-date repair and service shop was completed, increasing the work area of the plant by more than 100%, with second floor storage warehouse of sufficient capacity to stock several carloads of engines and equipment. Active management in Miami is under the direction of Arthur C. Knorr, now president of that corporation. Frank Knorr, Jr. is president and general manager at Tampa.

General Manager

Kjell O. Nilsson

The appointment of Kjell O. Nilsson as general manager of the Witte Engine Works of United States Steel's Oil Well Supply Division at Kansas City, Missouri, was announced recently by Fred F. Murray, president of the division. Witte Engine Works designs and manufactures diesel, gasoline and gas engines for oil country, general industrial and farm use. A native of New York, Mr. Nilsson entered the employ of "Oilwell" in 1952 as assistant to the works manager.

Prior to his employment by U. S. Steel has was associated with American Bosch Corporation in the factory and sales division. Mr. Nilsson will be assisted in his new responsibility by D. M. Hochswender, manufacturing manager; Dr. F. J. Kogel, chief engineer; M. E. Nicklin, sales manager, and L. A. Tilman, auditor.

Dynamometers Detailed in Booklet

A 16-page, two-color booklet, detailing its complete line of liquid-cooled, absorption, motoring, universal and special-purpose dynamometers, has just been released by the Dynamatic Division, Eaton Manufacturing Company, Kenosha, Wisconsin. Included in the free literature, known as Bulletin DB-1, is descriptive matter pertaining to the construction of the equipment, accessories, and controls. Typical installations are detailed.

Profusely illustrated, the booklet contains dozens of operating and product photographs, engineering drawings, graphs and tables. It presents one of the most comprehensive discussions of such equipment ever produced. Copies of this literature are available, without cost, from the Dynamatic Division, Eaton Manufacturing Company, 3300 11th Avenue, Kenosha, Wisconsin.

Chief Engineer

Robert Von Rotz

The appointment of Robert Von Rotz as chief engineer of Tuthill Pump Company, Chicago, has been announced by H. T. Kessler, president. Mr. Von Rotz has an extensive engineering background covering 27 years of technical and management experience with leading corporations, it is stated. He brings with him wide training in research, development and design in both the low and high pressure pump fields through previous association with the Ingersoll Milling Machine Co. of Rockford, Illinois; Vickers, Incorporated of Detroit, Michigan; and New York Air Brake Company, New York. Prior to his joining Tuthill, Mr. Von Rotz served as chief engineer with Applied Research and Development Corporation of New York City and Berne, Switzerland.

Diesel Highway Tractor Purchase

Riss and Co., Inc., of Kansas City, Mo., one of the largest private trucking operators in the world, has purchased 500 GMC diesel highway tractors from the GMC Truck and Coach Division, it was announced recently by Philip J. Monaghan, vice president of General Motors and general manager of the division. It is one of the largest purchases of such highway equipment on record.

The units are GMC cab-over-engine, tandem-axle models, with sleeper cab, powered by six-cylinder GM diesel engines generating 200 horsepower, capable of hauling 70,000 lbs. gross combination weight. The GMC model designation is DFT-922-67. The new tractors will be used on more than 40,000 miles of Riss routes through 22 states and 27 Riss terminals ranging from Denver, Colo., to Boston, Mass., and Detroit to Fort Worth.

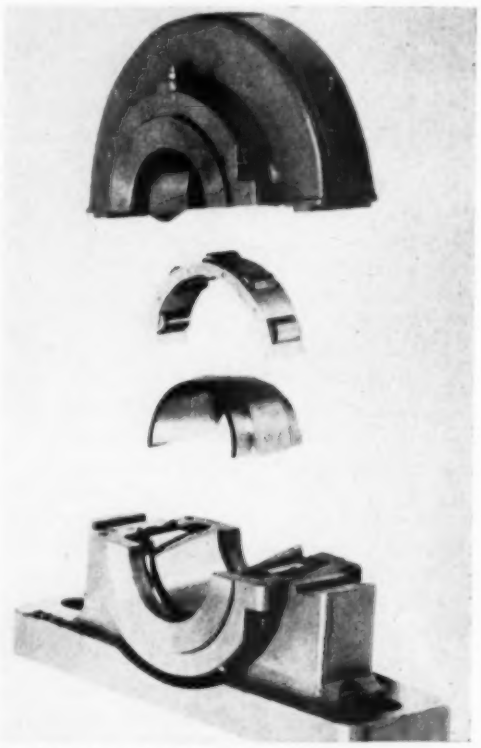
Founder and now Chairman of the Board of Riss and Co., is Richard B. ("Dick") Riss, 49, whose pioneering in the truck transportation industry and bold business genius are stories of fantastic proportions. Last year, Riss, who as a boy in Poplar Bluff, Mo., worked for a banana merchant, acquired 1,200 trailers in a purchase described as the largest ever made in trucking history. His son, Robert B. Riss, is president of Riss and Co., while another son, Richard K. Jr., is president of Transport Manufacturing and Equipment Co., Kansas City.

Split Bearings

American engineers and designers, facing difficult or impossible bearing location problems have had new solutions made possible by using Cooper Split Roller Bearings. The components of Cooper Split Roller Bearings are split right down to the shaft, and the bearings can be applied where it is impossible to mount conventional type solid ball or roller bearings.

The split feature does not limit the applications of Cooper Bearings because the split design permits an anti-friction roller bearing to be assembled around the shaft. Bearings are made in halves throughout. Races and rollers are high carbon-chrome alloy steel, thorough-hardened for strength and maximum load carrying capacity. Races and rollers are accurately ground with a high finish to fine limits. Races are split on a diagonal to insure continuity of contact area between roller and race. Cages are aluminum alloy for lightness and strength. Cartridge and pillow block housings are stress-free grey iron castings, with machined elements held to close tolerances.

Fixed type (sometimes called grooved-race bearings) are used as shaft locating and radial-thrust bearings. Expansion type (sometimes called floating type bearings) are used to accommodate end play and shaft expansion. Bearings are housed in split cartridges with self-aligning, spherically ground O.D., which are mounted in machined split pillow blocks. The halves of the inner race are clamped onto the shaft with locking collars. Bearing assembly is completed by placing the halves of the outer race in position. Split cartridge or other split housing is fixed around bearing, which is then ready for use.



Exploded view of standard Cooper Split Pillow Block, showing how the complete bearing, housing and mounting can be assembled around the shaft without disturbing the shaft from its working position. Diagonal joints between halves of races insure gradual transferal of load as rollers pass over them.

Cooper Bearings are made in England and heretofore have been available only through Canadian distributors. Now, complete distributor stocks, large central warehouse stocks, and six-week deliveries of specials from England places them at the disposal of U. S. manufacturers. A permanent U. S. sales and engineering organization has been established. A new, comprehensive catalog of the entire Cooper Split Roller Bearings is available by writing to the Cooper Split Roller Bearing Corporation, 700 Cedar Boulevard, Pittsburgh 28, Pennsylvania.

Joins Sales Engineering Staff

Lawrence A. Gerber

Lawrence A. Gerber has joined the sales engineering staff of the Honan-Crane Corporation, according to an announcement from D. J. Jones, the company's manager. With headquarters in Dayton, Ohio, Mr. Gerber will cover southwestern Ohio, southeastern Indiana and eastern Kentucky. Prior to joining Honan-Crane he was on the engineering staffs of Moraine Products Division (GMC) in Dayton and E. I. du Pont de Nemours in Cleveland. Mr. Gerber holds a B.S. degree in Industrial Management from Miami (Ohio) University.

R.E.A. Award Presentation

Replica of the award plaque presented to the winner last year.

For the past three years DIESEL PROGRESS has awarded a bronze plaque to the most efficient R.E.A. internal combustion plant. Selection of the winner each year is based on that plant's capacity in delivering the maximum kilowatt hours to the switchboard in relation to the millions of btu. in the fuel they used—whether it be natural gas or diesel fuel.

The first award was made for the year 1951 and was won by the Graham County Electric Co-operative, Pima, Arizona. The plaque was awarded their manager at the R.E.A. annual meeting held in Milwaukee in April, 1952.

The second award for the year 1952 was won by the Wolverine Electric Co-operative, Big Rapids, Mich. for their Hersey plant. The plaque was awarded to their manager at their main office in Big Rapids, Mich. last April.

The third award will be announced very shortly, covering the year of 1953. The plaque for this winning plant will be awarded to the plant's manager at the Annual R.E.A. meeting to be held in the Melbourne Hotel, St. Louis on April 26th. The article describing the winning plant and giving details of how that plant won will appear as the feature of our May issue.

This contest, originated and fathered by DIESEL PROGRESS has been hotly contested each year and has done much to bring the large number of R.E.A. generating plants more closely together. This contest has definitely improved the overall operating efficiency of this large and growing group of diesel, dual fuel and natural gas engine users.

The conference committee states that this conference is not restricted to R.E.A. Co-operatives entirely. The committee wishes to invite any municipality or utility desiring to send a delegate. For additional information, contact Harry F. Collins, assistant manager, Illinois Rural Electric Co., P.O. Box 186, Pittsfield, Illinois.

Locomotive Rebuilding Service

A locomotive rebuild service established to rebuild and repair entire diesel units and their component parts has been announced by the American Locomotive Company. This new service is designed to assist all railroads to maintain and improve the high utilization standards inherent in the diesel locomotive. A second principal objective of the service is to help railroad customers to keep locomotive repair costs at the lowest level possible without costly capital expenditure for major repair facilities. The company will utilize a portion of the diesel locomotive production facilities at its Schenectady plant for the rebuild service.

Executives of the company point out that many of the thousands of Alco diesels in operation, particularly those built during and before World War II, have reached a service age which justifies rebuilding or modernization to latest designs. They add that constant improvement in design and production of locomotives has made it possible for railroads not only to extend the service of older diesels, but to better their savings through modernization. The new Alco locomotive service is available immediately and includes the repair of wrecked or damaged diesels.

Filter Bulletin Available

A new 12-page illustrated bulletin describing Staynew Automatic Filters designed for large air volume and high efficiency has been announced by the Dollinger Corporation, Rochester, N. Y. The bulletin contains specifications, engineering and performance data covering automatic filters in a wide range of sizes for handling any desired air capacity. A copy of Bulletin #500 is available from the Dollinger Corporation, 11 Centre Park, Rochester 3, N. Y.

Conducts Seminar

Inspecting a titrimeter used in testing Porus-Krome plating baths are, seated, Mr. McDonald; standing, left to right, Mr. Young, Mr. Edwards, Mr. Grammer, and Mr. W. J. Fritton, Van der Horst Corporation Vice President and Sales Manager, instituter of the seminar.

Going beyond the limits of the axiom that "the customer is always right," the Van der Horst Corporation believes that the customer has the right to know what materials and methods are used in the production of equipment purchased. Van der Horst, one of the world's largest electroplating industries, and inventors of the Porus-Krome and Vanderloy processes, instituted the practice of inviting customers to attend seminars that are held periodically in their extensive Olean, N. Y. laboratories and plants.

On January 19th and 20th three of the most prominent petroleum transport organizations in the midwest were represented at a Van der Horst seminar by Mr. A. C. Grammer, port engineer for the Northern Division of Lake Tankers, St. Louis; Mr. Hy Young, port engineer for the Marine Division of Ingram Products, Nashville, and Mr. Larry McDonald, marine sales representative for the Western Rivers Division of Socony-Vacuum Oil Co., St. Louis. Accompanying the group was Mr. R. W. Edwards, sales engineer for Sample Brothers, St. Louis, Missouri.

In the course of the seminar the group had an opportunity to observe the steps employed in the reclamation of diesel power cylinder liners by the Van der Horst processes. In addition to their Olean facilities, Van der Horst has plants in Terrell, Texas, Hilversum, Holland, and Los Angeles, Calif. (Spar-Tan Engineering Co. is the west coast licensee.)

Revised Bulletin

Latest information on GE's "Middleweight Champion" of the rails, its 70-ton locomotive, powered with a 660 hp. Cooper-Bessemer diesel, has been updated in a bulletin now available from the General Electric Company, Schenectady 5, N. Y. Designed GEA-4657B, the 16-page, two-color revision describes over-all locomotive performance, the power plant, the electric drive, equalized swivel trucks, control, and new features. Cutaway views of the locomotive and some of its components have been included in the publication; while advantages of the 70-tonner are illustrated by actual case histories.

All current owners of G-E 70-ton locomotives are also listed.

Meeting and Exhibit

The time is drawing closer to the 1954 Kansas City Convention of the Oil and Gas Power Division of the ASME. The Muehlebach Hotel will play host to the convention June 14 to June 17. This important meeting is drawing widespread interest and attention from a large number of engineers. It is anticipated that attendance will far exceed that of previous conventions. Represented will be operators of large diesel plants such as utilities, municipalities, pipeline pumping stations and the large engine builders themselves.

An exhibit of the products of diesel accessory suppliers will be held in conjunction with the convention. Because late-comers were unable to rent any exhibit space last year, reservations were made very early for this year's exhibition by most exhibitors. For information regarding availability of such space, contact Joseph Clark, c/o ASME, 29 West 39th St., New York, New York.

Rig Uses 3200 Diesel Horsepower

Four banks of GM Series 71 twins and one single GM 6-110 Diesel drive the main and mixing pumps. The entire rig is compacted into 20 truck loads when on the move. Two 60 kw. GM diesel generator sets are housed under the tank at the right of the picture.

Richfield Oil Corporation's newest and biggest oil well drilling rig, capable of drilling safely to 15,000 feet, was started on its first hole recently in North Coles Levee near Bakersfield, California. By mid-December a depth of 9000 feet had been reached and at that point the 4½-inch pipe in 90-foot stands was pulled in one hour and twenty minutes. The rig's equipment includes a 143-foot Ideco full-view mast, an Oilwell #96 drawworks, two D-500 Emsco mud pumps, one D-300 Emsco mud-mixing pump, two 60 kw. generator sets and a Hooper Machine Works coring reel.

The rig is powered by 18 GM Detroit diesel engines in single and multiple units, representing a total of approximately 3200 rated or 2800 continuous horsepower. Most of the engines have General Motors torque converter drives. Lawless Brothers, of Bakersfield, assisted Richfield engineers in working out the rig's power requirements.

Addresses Heat Exchange Institute

Mr. D. W. Retzinger, sales manager of the Heat Exchanger Division of the Young Radiator Company, Racine, Wisconsin, and Mattoon, Illinois, addressed the University of Wisconsin sponsored Heat Transfer Institute scheduled January 25, 26 and 27. Mr. Retzinger discussed "Shell and Tube Industrial Heat Exchangers," and pointed out general types in use, stating, "either of these types can have variations of pass arrangements, baffle spacings, tube sizes, tube pitch, and tube bundle arrangement, which are the variables that determine the performance of the equipment." He referred to design details, applications and methods of obtaining accurate heat transfer coefficients with allowance for fouling factors in heat exchanger selection. Free copies of this informative 24-page heat exchanger analysis may be obtained by sending your request to Young Radiator Company, Racine, Wisconsin.

Illustrated Bulletin

The National Supply Company's Model 35 Atlas Imperial marine diesel engines are presented in a new 8-page illustrated Bulletin No. 419. Design and operating features, construction specifications, performance curves, and dimensions are given for a 4-cylinder engine, 110 hp. at 1000 rpm. and for two 6-cylinder engines rated at 195 hp. and 300 hp. (supercharged) at 1225 rpm.

Inland River Reports

By David I. Day

THE *Reba Jane* of the Thomas Petroleum Transit, Inc., fleet has been making fast runs from Port Arthur, Texas, to Vanport, Pa., some 28 miles below Pittsburgh on the Ohio. She uses a 3-barge integrated tow, cargo consisting of solvents usually. This is an excellent boat, built by the Gulfport Shipbuilding yards at Port Arthur in 1948, the first river towboat ever built there. She uses a 1700 hp. Enterprise engine.

WE noted Mrs. G. V. Horton, Pittsburgh, Pa., taking a picture of the *Jeffboat* of the American Barge Line fleet at a considerable distance, using a telescopic lens attachment. The boat was pushing ten or 12 barges of steel and one or two with other commodities. This pusher uses twin engines, Fairbanks-Morse, total 3200 hp.

NEWS from the lower Mississippi indicate fine performance by the *Meriwether Lewis*, with a single 1700 hp. Enterprise engine in the oil trade. The boat is in the fleet of the Commercial Petroleum & Transport Co., Houston. Capt. Warren Davis is in command.

CHIEF Engineer George Hill of the *DeSoto* has all reasons to be proud of the performance of his engine room. We noted this boat passing up near Memphis running as smoothly as any vessel on the Father of Waters. Chief Hill uses General Motors twins, with about 1800 hp. total.

THE *Aztec* of the Indian River Lines is towing coal from the big mines at Caseyville, Ky., to St. Louis turning in fine performances regularly. She has twin Fairbanks-Morse engines rated at 3600 hp., total. Kimble Swift, chief engineer, is ably assisted by Bob King and George Riddle.

IT WAS a pleasure to see our old favorite, the *Chilli Simpson* on the same stretch of muddy channel, also upbound. She is one of the Simpson Oil boats of Charleston, Mo., and has rendered fine service the last seven or eight years. She has a Cooper-Bessemer engine room with over 2200 hp.

THE *John Morris* of the Patton-Tully Transport Co., Memphis, made her first trip to the upper Ohio recently. However, the lower river and the Mississippi River folks know her better. She was built in 1944 and presently has a 1440-hp. Fairbanks-Morse engine.

THE *Lady Ree*, fast towboat owned by the Queen City Towing Co., Greenville, Miss., is becoming a familiar visitor on the upper Ohio. She is one of the best in the 1800-hp. class. She uses twin General Motors engines. Charles Switzer is her chief engineer.

OUR compliments of the month to the little *Jolly Roger* of the Blaske Lines. She has 200 hp. only using two small Kahlenberg engines. But she is busy and has many friends. Her trade is between Liverpool and Havana, Ill., on the Illinois with Capt. Ted Lowe currently in charge.

New World Headquarters

Ground-clearing has been started on the eight-acre site of the new World Headquarters Building of the Fram Corporation on Pawtucket Avenue in East Providence, R. I., according to company officials. Construction begins early this year. The new building, which will cost nearly $500,000, will be one of the most modern office buildings in America when completed by summer of 1954. The unique and unusual architectural design employs a light-weight steel wall only two inches thick with glass and porcelain covering. The erection of the new headquarters building marks the 20th anniversary of Fram, one of the world's largest automotive filter manufacturers. Fram has progressed from a small Providence chemical laboratory two decades ago to a world-wide organization, marketing its products throughout the U. S. and Canada, with licensed manufacturers in eight foreign countries.

Service Awards

Fifteen-Year award. Presentation of a gold and diamond award to J. L. Peeler of Cummins Sales & Service, Inc. is made here by President Ken W. Davis.

Service awards were presented Fort Worth Cummins Sales & Service, Inc. employees in recent ceremonies. The awards, gold and diamond replicas of the company's trademark emblem, were conferred by President Ken W. Davis and Vice President—Sales J. T. Calnon. J. L. Peeler received a fifteen-year award. Ten-year awards were conferred upon J. L. Troutz and J. A. Webb. Five-year service awards went to Nona Armstrong, G. E. Ball, C. E. Bullington, H. B. Burr, J. T. Calnon, L. C. Gilstrap, L. C. Hardin, J. P. Hunter, A. R. Kennedy, H. L. McIntosh, D. M. Peacock, A. J. Poplin, K. E. Rich, and Roosevelt Williams.

Service awards are based on five-year intervals, and since this year was the beginning of the awards program, the 1953 awards did not reflect each employee's exact period of service. For example, an employee with nine years' service received a five-year award, and will hold that award until his tenth year has passed, at which time he will receive the next higher award.

SAVE INJECTORS

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Water Separator & Fuel Filter

The new FRAM Water Separator & Fuel Filter is a *double-action* filter for complete injection system protection. Here's what it does—

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Traps Dirt and Dust — Micronic filtration traps and removes dangerous dirt before it reaches injectors . . . ends abrasive action!

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Keeps lube oil *clean*. Removes dirt and sludge. Cuts wear. Reduces down-time. Your diesel needs FRAM for dependable performance year after year. See your FRAM Distributor today.

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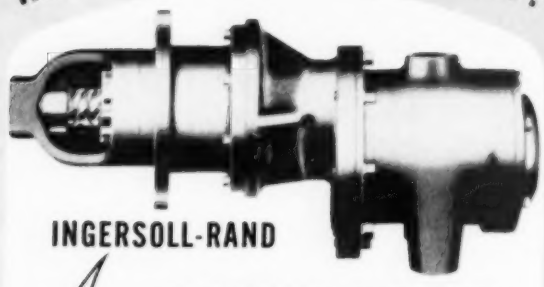

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887-18A

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11 Broadway, New York 4, N.Y.

DIESEL ENGINE CATALOG

The purpose of this little advertisement is to tell you about Volume 18 of DIESEL ENGINE CATALOG which is now available, entirely revised and rewritten. This is the 18th edition of the book that has earned the name of "the bible of the industry."

All smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar, the DIESEL ENGINE CATALOG gives them full, accurate information when they need it most.

The consulting engineer keeps this book in his reference file. It immediately gives him *all* data on diesel engines coming within a given horsepower range, speed range and weight range.

People who sell, people who buy, people who use diesel engines need this new, fully illustrated, up-to-the-minute volume. It has been completely revised and expanded. Orders are now being accepted for this latest edition. Price $10.00 prepaid.

Add California Sales Tax for Delivery in That State

DIESEL PROGRESS
816 N. LA CIENEGA BLVD.
LOS ANGELES 46, CALIFORNIA

Elected President

W. E. Wilkening

At its last regular meeting, the board of directors of Wilkening Manufacturing Co., Philadelphia, maker of Pedrick piston rings, elevated Mr. F. W. Wilkening, one of the founders and president since 1921, to the post of chairman of the board. Mr. William E. Wilkening, who has been with the organization since 1936, most recently as vice-president in Charge of Sales, was elected president, succeeding Mr. F. W. Wilkening. At the same meeting, Mr. Henry E. Gerstley was named vice-chairman of the board and continues as treasurer of the company. Mr. David A. Cowhig was named executive vice-president, and Mr. William S. Loeb was named senior vice-president.

Tank Truck Consolidation

The Interstate Commerce Commission has approved the consolidation by purchase of three franchised tank truck operations, resulting in the formation of the largest bulk liquid trucking concern in the West. Actual merger of property and personnel was effected recently, it was reported by M. E. Bealey, the vice-president of System Tank Lines, an affiliate of West Coast Fast Freight.

Under the ICC order, System has purchased Lang Transportation Corp. and Manning Tank Lines, Inc., both of Los Angeles, for $847,250. The transaction transfers nearly 4,000 miles of operating rights, plus six truck terminal properties in four states. Previously, System had purchased Lang's truck equipment for $500,000 and then had leased it back to Lang.

Mr. Bealey said that the combined fleets, numbering 240 units, have a total capacity of 1.8 million gallons. They will operate in eight western states and western Canada. The former Lang and Manning portion of the operations are expected to gross $4,000,000 in revenue this year, and System $2,500,000, rating the new combination third largest in the country, it was learned. The principal commodities hauled are bulk petroleum products, although System franchises include authority to haul other liquids, chiefly tallow and chemicals.

Bealey said that the most typical haul was of large bulk gallonage from refinery to distributor plant, but that the merger would enable the company to expand a direct refinery to service station "clipper" operation which it recently initiated.

Announces Boat Installations

The Crofton Diesel Engine Co., Inc., of San Pedro, California has announced a dozen new GM diesel installations during the past few months in various fishing boats and yachts. The following had main propulsion units installed: *Sea Pal*, fishing boat, a GM 4-51; *Chubasco*, yacht, a GM 4-51; *Pilot #1*, a harbor towboat, a GM 6-110; *Victoria*, fishing boat, a GM 2-71 and a GM 6-110; *Little Tramp* yacht, a GM 4-71; *Evelyn R*, fishing boat, a GM 6-71; and a fishing boat owned by Farallone Fisheries of Santa Barbara, a GM 6-71.

The following had auxiliaries installed: *Sea Bright*, a live bait boat, a GM 2-51; *Camarello*, fishing boat, a GM 4-71; *Aurora*, fishing boat, a GM 3-71; *Santa Lucia II*, fishing boat, a GM 3-71.

West Coast Office

A west coast sales office has been established by Allison Division of General Motors, it was announced recently by H. N. Roberts, assistant sales manager of the transmissions operations at Allison. The new office, located at 2565 Rose Street, Berkeley, California, will deal with the sales of torqmatic converters and transmissions for the oil field, off-highway truck and excavator industries. W. C. Edwards has assumed charge of the new office and will be known as west coast sales engineer. F. S. Strain has been appointed west coast service representative and will also be located in Berkeley. Mr. Edwards, formerly in charge of the eastern territory, came to Allison in February, 1949 as a senior clerk and was appointed sales engineer in February, 1953. He was born in Clanton, Alabama and is a graduate of Purdue University. Mr. Strain, a native of Indianapolis, came to Allison in June, 1951 as a service representative trainee and was appointed service representative in December of the same year.

Power When and Where Needed

Living conditions on construction jobs are almost luxurious today. Typical of construction camp housing is this trailer colony which houses employes of the Myrl Clark Construction Company of Tyndall, S. D., who were working on a highway construction job near Belle Fourche, S. D. Electric power is supplied by a 20-kw. Ready-Power generator driven by an International UD-6A diesel engine. A similar unit is kept as a standby near the contractor's shops.

Florida Flood Control

Six Fairbanks-Morse pumps with a capacity of twice the Mississippi River's normal flow and costing $2,500,000; are being installed in the Lake Okeechobee area as a part of the U. S. Corps of Engineers South Florida flood control project. The pumps will be the heart of an installation near Belle Glade. Col. R. T. Dodge, assistant district engineer at Jacksonville said, "we expect to have three of them in operation this August and the other three by March 1955.

The 116 inch horizontal pumps will be powered by Fairbanks-Morse diesels rated at 1470 hp. each. Diesels rather then electric were chosen to avoid the danger of such a high line power failure as is likely in a hurricane.

New Overspeed Shutdown Governor

A new low cost, simply constructed overspeed shutdown governor has been developed by Massey Machine Company. Designated the Type OS Shutdown Governor, the unit is a low cost, precision centrifugal governor which trips an Underwriter's approved 110 volt ac. 15 amp. single pole switch to break contact at set speed, usually 10% above rated engine speed. The tripping action is adjustable while running for any speed from 500 to 1500 rpm. and after it trips it can only be reset by pushing the reset button on top.

The governor is entirely enclosed and requires no lubrication because it has grease lubricated ball bearings sealed for life. The size is small, the unit being only 3-inches in diameter and it extends only 5¾-inches above the mounting flange. Aluminum casings keep the weight down to 3½ pounds. Mounting can be either vertical or horizontal. Advantages claimed for the unit are the low initial cost, simple installation and easily installed interconnecting wires enables the governor to trip several things at the same time.

A catalog bulletin describing the Massey overspeed shutdown governor is available. Write to Massey Machine Company, 900 Pearl Street, Watertown, N. Y. and ask for Catalog No. OS-254.

Shifts Personnel

J. H. Gill

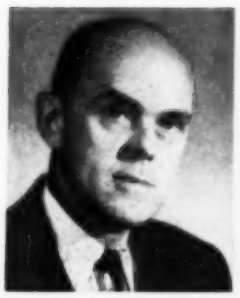
J. H. Gill has been named manager of industrial sales section, it has been announced by H. H. Howard, manager of the newly formed engine division at Caterpillar Tractor Co., Peoria, Ill. He replaces H. W. Smith, who will relinquish this duty to become consulting engineer. Mr. Gill came to Caterpillar in 1937 and has held positions as an engine representative and as a field representative in the engine sales department. He also has been engine sales consultant in the general sales department.

Mr. Smith joined Caterpillar in 1929, after a background of engineering, design and administrative work for various business concerns in California. After two years as assistant chief engineer for Caterpillar, he moved to the special sales division, and five years later became assistant manager of engine sales. In 1944 he became manager of industrial sales. H. J. Hunkele will become assistant manager of industrial sales, relinquishing his duties as assistant sales manager, central sales division.

EMD Personnel Changes

Victor E. Rennix

W. H. Fritts



George W. Rukgaber

Charles L. Moss

A. O. Myers

Promotion of Victor E. Rennix, regional manager, Chicago, to general sales manager of Electro-Motive Division of General Motors is announced by Paul R. Turner, director of sales. Mr. Rennix succeeds W. N. Fritts, transferred to special assignment by the general manager. In other changes announced by Mr. Turner, George W. Rukgaber is promoted to regional manager, Chicago, from district sales manager, Chicago; Charles L. Moss, promoted to regional manager, Jacksonville, from district sales manager, New York; and A. O. Myers, transferred to industrial sales engineer, La Grange, from regional manager, Jacksonville.

Mr. Rennix, a native of Dublin, Ireland, came to the United States shortly after birth and received his common and high school education at Ardmore, Pa. He was graduated from the Drexel Institute of Science and Industry in Philadelphia as a mechanical engineer in 1924, and then attended Wharton School of Finance at the University of Pennsylvania.

Mr. Fritts, a graduate of the University of Wisconsin where he received his B.S. degree in electrical engineering in 1934, began work at Electro-Motive in December, 1935, as a draftsman in the engineering department. He was engineering representative on the first diesel freight locomotive, a General Motors demonstrator which was in more than 100,000 miles of tests.Mr. Rukgaber, district sales manager in the Chicago region since July 1, 1948, was manager of the General Motors "Train of Tomorrow" from early 1946 until his transfer to Electro-Motive as a district sales representative in Chicago in April, 1948. Mr Moss, who has been district sales manager in New York since June 1, 1951, was educated in the Chicago public schools and joined Electro-Motive May 15, 1936, as an electrician in the locomotive division. Mr. Myers, regional manager at Jacksonville, Fla., since Sept. 1, 1952, joined Delco-Remy Division of General Motors in 1927, after receiving the degree of electrical engineer from Ohio State University.

Pinion Setting Gauge Brochure

A four-page illustrated brochure describing its pinion setting gauge, designed to take the guesswork out of rear-axle overhauls, has just been released by the Kent-Moore Organization, Inc., Detroit, leading manufacturer of special automotive tools and equipment. Used to determine quickly and accurately the depth of the pinion relative to the ring gear, the gauge has been tested by several large motor-truck and axle manufacturers and approved as an important adjunct to shop service. Applicable to both bevel-gear and hypoid axles, the pinion setting gauge eliminates guesswork and assures positive accuracy to factory standards in axle assembly. Copies of the brochure may be obtained by writing to the Advertising Department, Kent-Moore Organization, Inc., 5-105 General Motors Building, Detroit 2, Michigan.

Diesels On The Go

Construction veterans. This is one of three Bay City cranes owned and operated by Patti Construction Company, Kansas City, Missouri. The oldest is 7½ years old, and the newest three years old. The crane shown here, working on the foundation of the new Kansas City, Kansas Post Office, is a Model 450 Bay City with a ¾ yard bucket. It's power—a 110 hp. Model HRIP-400 Cummins diesel. The other two Bay City cranes are powered with 150 hp. Model HBI-600's. The owners report, "It hasn't been necessary to overhaul any of the three diesels on our cranes. We keep them busy the year 'round, and we find that they are always ready to go."

New Market Catalog

Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, has published a new market catalog "Rural Jobs Offer New Opportunities for Contractors." The new two-color catalog evaluates the volume of potential business available to contractors from farmers planning such farm conservation jobs as land clearing and reclamation, earth moving for irrigation and drainage, terrace and diversion channel construction, pond and reservoir building, and other farm jobs requiring the power and versatility of crawler tractor, motor scraper or motor grader . . . equipment not owned by farmers. Action photographs of the equipment illustrate each of various job applications described.

Road-Building Symposium

Harald T. Reishus

Harald T. Reishus, vice president of International Harvester and executive head of the company's Industrial Power Division, presided at the recent Road Building Equipment Symposium which took place at the annual meeting of the American Road Builders' Association in Atlantic City. Mr. Reishus, as 1953 president of the Construction Industry Manufacturers Association and as chairman of the symposium, spoke on the Economic Results of Mechanization.

Adds to Selling Staff

Henry Holmes Greene has joined the selling staff of the Los Angeles Terminal of the Ringsby System, Inc., according to Western Division Sales Manager, Joe Wade, in a statement given at the firm's Los Angeles office. With seven years' experience in the West Coast area divided between transport and sales promotion activities, following his U. S. Army Air Corps experience, Mr. Greene tackles his new post with energetic assurance that 1954 will be another booming business year.

A graduate of Knox College in Galesburg, Illinois, Mr. Greene added a graduate course in engineering at Chicago schools.

Buda Distributor

The Buda Company, Harvey, Illinois, division of Allis-Chalmers Manufacturing Company, manufacturers of oilfield, industrial, and automotive engines and generator sets, has announced that their subsidiary, Buda Engine & Equipment Company, Inc., effective February 1st, 1954, succeeds their former distributor, Buda Engine Sales & Service, Inc., in the states of Oklahoma and Kansas. The factory branch will be located at the same address, 521 West Archer Street, in Tulsa, Oklahoma.

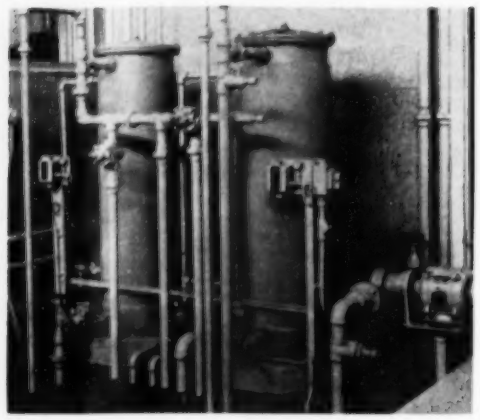
At Motorboat Show

One center of interest at the National Motorboat Show at New York's Kingsbridge Armory was the new Fairbanks-Morse opposed-piston diesel, a smaller version of the engine that powers U. S. Navy submarines. At left is the first of the new units to be exhibited in the East, a 5-cylinder diesel rated at 375 horsepower at 1200 rpm. At right is a cutaway showing the actual operation of the O-P engine with two pistons in each cylinder. Fairbanks-Morse asserts that the new engine, available in sizes from 225 to 750 hp., will be a bread-and-butter engine for tugs, fishing boats and other commercial vessels, and a luxury diesel for pleasure craft 60 ft. and larger.

1955 Convention Set

The 1955 annual convention of the Associated Equipment Distributors has been set for the Conrad Hilton Hotel in Chicago, January 23 through January 28, 1955. This national trade association of the construction equipment industry held its 1954 convention in New York City at the Waldorf-Astoria Hotel, January 31 to February 4 and was attended by over 2500 construction equipment distributors and manufacturers.

Trans Mountain Filtration System



One of the Winslow filter installations on the Trans Mountain Pipeline pumping system. This is one of the first crude oil filtration systems. The filtered crude is used for fuel.

The most complete filter system ever designed for any pipeline pumping system has been installed on the 718-mile Trans Mountain pipeline (see DIESEL PROGRESS, Jan. 1954) which will carry crude oil from Western Canadian fields to refineries on the Pacific Coast. The system of fuel filtration to be used on the Trans Mountain line was developed by the Winslow Engineering Company of Oakland, California to burn crude oil of varying specifications in standard model diesel engines. Winslow crude filters have been installed at the Edson, Black Pool, and Kamloops stations of the Trans Mountain line. The filter system is a series of jacketed Winslow filters of increasing density with elements treated for removal of moisture and solid particles and the neutralizing of dissolved sulphur compounds, which improves mechanical filtration as well as controlling possible acid damage. This removal of dissolved compounds and moisture also breaks any bond which might tend to form a sludging action.

The Trans Mountain system is based on similar Winslow pipeline installations by which satisfactory fuel is supplied pumping engines. Winslow filtration of crude oil has resulted in reduced engine maintenance and down time, as well as improved performance and efficient fuel usage. Winslow full-flow lubricating oil filters are also installed on all the main Nordberg pumping engines, thus assuring clean lubricant at all times, under cold start or normal operating conditions.

"Hydryer" Bulletin

J. F. Pritchard & Co. have prepared a new bulletin describing their line of "Hydryers." These units are packaged dehydration plants for the efficient drying of air or other gases in all industrial and laboratory installations. The bulletin goes into a description of the basic process involved, drying, reactivation, length of operating cycle, adsorbents, sizes, controls and special units. Diagramatic drawings, tables giving load factors, sizes, dimensions and photographs are included. This informative publication is obtainable from J. F. Pritchard & Co., 210 West 10th St., Kansas City 5, Missouri. Ask for the bulletin entitled, "Pritchard Hydryers."

25,000,000th Horsepower

F. G. Gurley (left) president of the Santa Fe, watches N. C. Dezendorf, vice president of General Motors and general manager of Electro-Motive Division, place plaque on 16-cylinder, 1500-horsepower diesel engine representing 25,000,000th horsepower built by Electro-Motive since the General Motors 567 series diesel engine was introduced in 1938. The 25,000,000th horsepower engine will help power a new Santa Fe four-unit F7 freight locomotive. Railroad history was made with the 567 engine in January, 1941, when the first four-unit diesel freight locomotive was delivered to the Santa Fe. That locomotive, the famous ATSF, No. 100, was the first diesel freight locomotive to go into regular revenue freight service on the North American continent.

Commenting on the 25,000,000 horsepower, Mr. Dezendorf pointed out that "if that much horsepower were built into one diesel locomotive it could pull a train of 3,963,204 boxcars, each 42 feet long and weighing 40 tons, at 10 miles an hour on level track. Such a train would be 31,525 miles long.

Gulf Coast News

By Michael T. Pate

MODERN Engineering Company, Houston, has purchased from Buda Engine & Equipment Company, Houston, a Model 6 DT468 85-hp. Buda diesel which they will use to power a fire pump.

GULF Oil Company, Houston, has bought through Stewart & Stevenson Services, Inc., of Houston, four Series 110, tandem twin General Motors diesels, rated at 530 hp., which will be installed as matched pairs in two 85-foot steel crew boats being built for the company by Gulfport Shipyards, Port Arthur, Texas. The company will use the crew boats in offshore work.

J. M. MARTIN, Galveston, has bought through Stewart & Stevenson Services, Inc., of Houston, a General Motors Series 51, 4-cylinder diesel equipped with a 3:1 reduction and reversing gear, which he will use to repower a 35-foot shrimp trawler.

WILSON Manufacturing Company, Wichita Falls, Texas, has bought through Waukesha Sales & Service, Houston, two Waukesha diesels, model 6WAKDSU, rated at 305 hp. at 1600 rpm., which will be used to power a portable drilling rig being built for use in the Rocky Mountain area.

JOE Mirovich, Ingleside, Texas, has bought a General Motors Series 110, six-cylinder diesel marine propulsion unit with a 4.5:1 reduction and reversing gear which he will use to power a 65-foot shrimp trawler.

JOE Varnell, Galveston, has bought through Stewart & Stevenson Services, Inc., Houston, three General Motors Series 71 diesels, each developing 165 hp., which he will use to power a 61-foot triple screw deep sea party fishing boat.

JOE Grasso & Son, Inc., Galveston, Texas, has secured through Houston Engine & Pump Company, Houston, a Murphy diesel, model M-150, developing 150 hp. at 1200 rpm., equipped with a 3:1 Snow-Nabstedt reduction gear which will be used to power a 65-foot shrimp boat.

RAYMOND Dugat, Portland, Texas, has secured a General Motors Series 110 6-cylinder marine propulsion diesel unit equipped with 3.75:1 reduction and reversing gear, rated at 265 hp. The diesel will be used by the contractor to power a work boat.

BANKS Moreland Company, Houston, has secured from Houston Engine & Pump Company, Houston, a Murphy model 21 diesel Weld-Power unit rated at 100 kw. capacity. The unit, incorporating an Electric Machinery generator, will furnish power for automatic welding machines.

TELLEPSEN Construction Company, Houston, has secured two General Motors Series 71, model 2031-C diesel power units complete with Twin Disc clutches and 4:1 speed reducers. The units, secured through Stewart & Stevenson Services, Inc., of Houston, will power anchor winches on a special barge to be used on the company's contract for Creole Petroleum in South America.

SPENCER Construction Company, Fort Worth, Texas, has bought two Buda diesels, model DAS-841 to repower model TS-300 LaPlante-Choate earthmovers. Sales and installation were made by Buda Engine & Equipment Company, Dallas, Texas. The engines develop 265 hp.

HUMBLE Oil & Refining Company, Houston, has bought through Stewart & Stevenson Services, Inc., a General Motors Series 51, 4-cylinder diesel, rated at 87 hp., which Platzer Boat Works of Houston is installing in a 32-foot steel crew boat being built to the company's order for use in inland bays.

MUCHOWICH & Sons Fish Company, Freeport, Texas is having Four Brothers Shipyard, Galveston, install a General Motors Series 110, 6-cylinder diesel, rated at 265 hp., and equipped with a 4.5:1 reduction gear, in a shrimp trawler being built to their order.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

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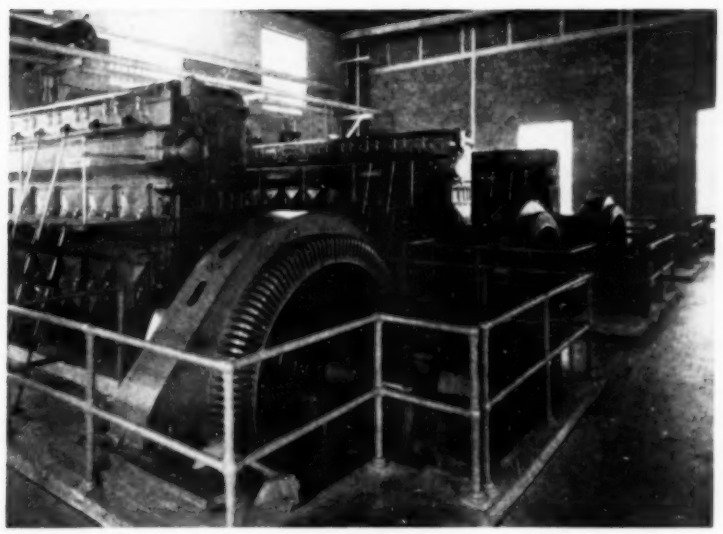

THREE TIRELESS E-M GENERATORS work at the new Bellefontaine plant, direct-connected to powerful diesels. E-M Generator frames are welded, rolled steel. Coils are specially insulated for high dielectric strength. Operating characteristics are perfectly matched to companion E-M Switchgear.

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The Bellefontaine engineer in the picture above is operating a masterpiece of modern Switchgear design.

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E-M Switchgear and Generator engineers are *specialists* . . . they select and blend together pre-engineered components into integrated combinations *matched exactly* to the individual plant's requirements. It takes extra-value engineering to do this well, as standard combinations just don't come close enough to intricate modern plant specifications.

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Your nearest E-M field engineer will be glad to tell you how E-M tackles such a job, and what successes we have had. For general background, write for Publication No. 194 on E-M Switchgear and No. 196 on E-M Generators.

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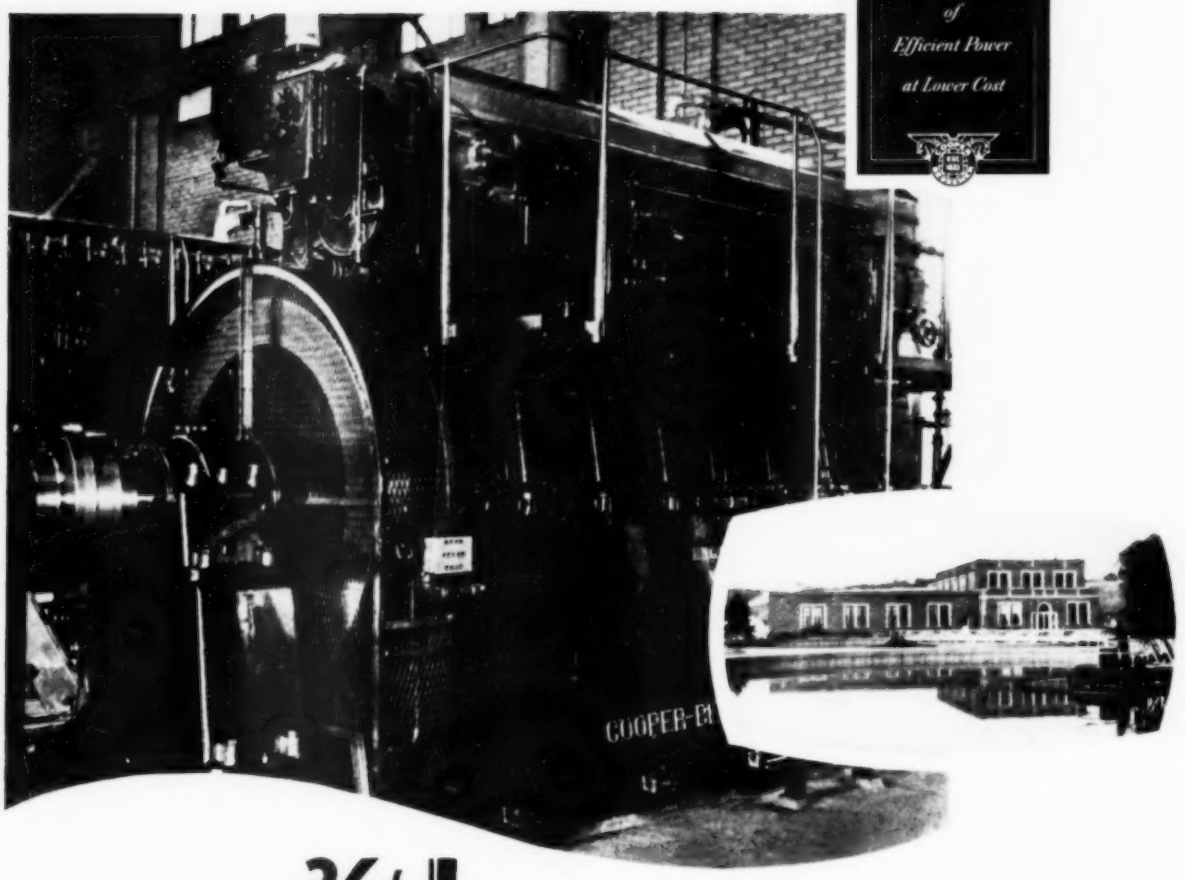

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